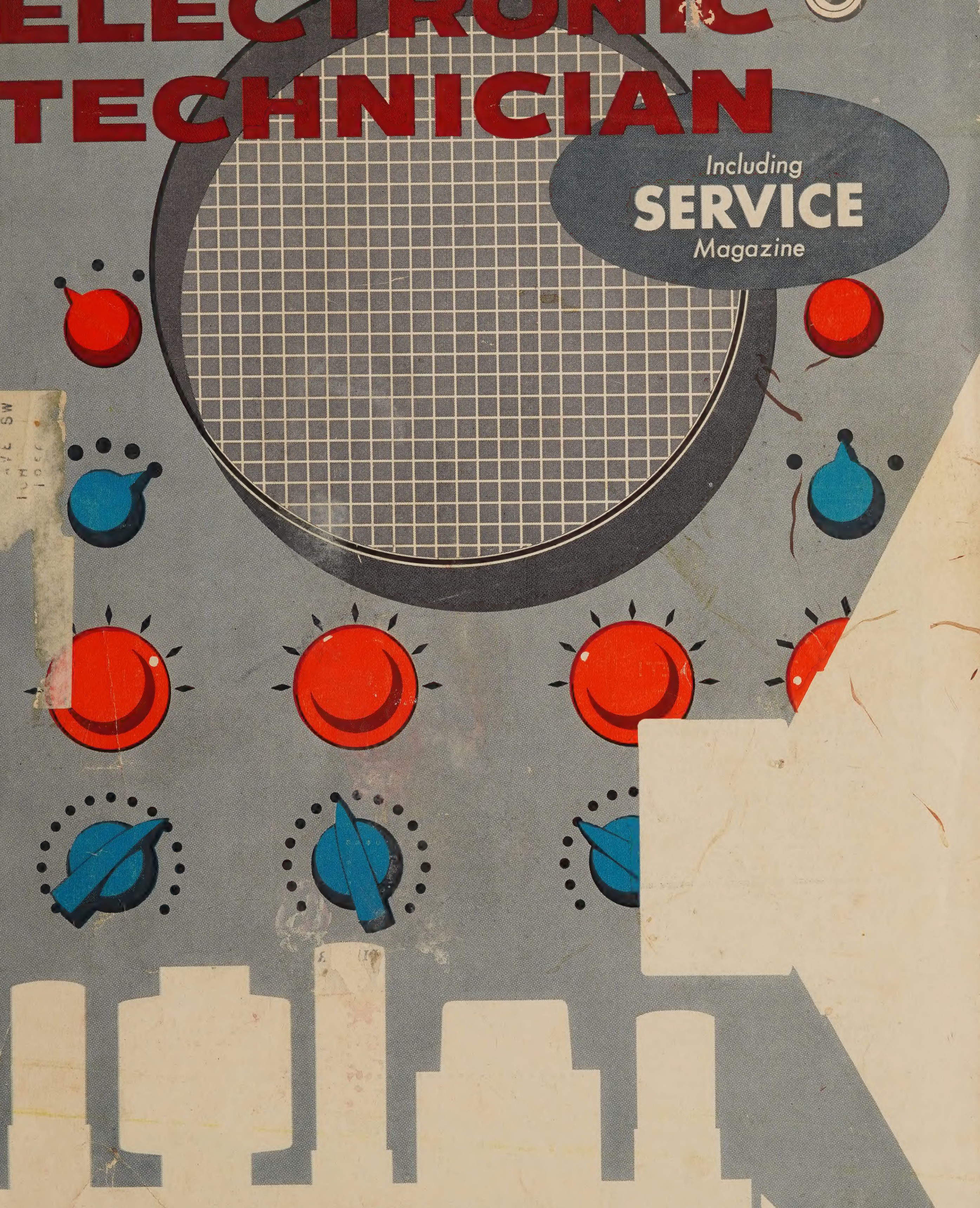
ELECTRONIC TECHNICIAN

Including
SERVICE
Magazine



HOW 'SCOPE AIDS AUDIO TROUBLESHOOTERS

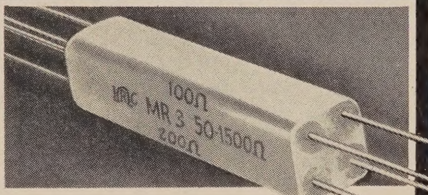
50¢

November • 1959

1ST TIME IN RESISTOR HISTORY

COMPLETE
10-WATT POWER RESISTOR
COVERAGE
IN JUST ONE
POCKET CASE!

50-1500 OHMS
10 WATTS
TYPE MR-3
MULTI-RANGE POWER RESISTORS
IRC
100 Ω MR3 50-1500 Ω 200 Ω
MR1 0.5-15 Ω
MR2 5-150 Ω 20 Ω
MR4 500-15K Ω 2000 Ω
MR5 3K-50K Ω 10K
3K-50K OHMS
10 WATTS
TYPE MR-5


100Ω
IRC MR 3 50-1500Ω
200Ω

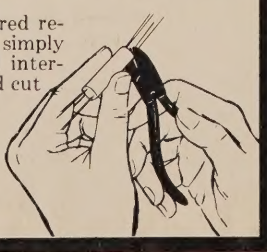
HERE'S THE SECRET!
With the new IRC
MULTI-RANGE RESISTOR
ONLY **5** TYPES
COVER
200
VALUES
10-watt ranges from ½ to 50K ohms

The first new approach to power resistors in 25 years. 4 separate elements sealed in a single, steatite case. Axial lead design speeds replacement. Steatite case provides superior insulation.

QUICK, SIMPLE TO ADAPT!

Only 10 basic terminal interconnections . . . all with axial leads. Connection diagrams in each Handy-Pak.

For the required resistance value, simply solder desired interconnection and cut off unwanted terminals.



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IRC MULTI-RANGE RESISTOR KIT!

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10 Type MR Resistors
$6.60
dealer net

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- Kit gives complete 10-watt coverage of 200 values.
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- Rigid, clear-plastic box with hinged lid.
- Measures only 5¼ x 1¼ x 3½".

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November, 1959

FRONT COVER Servicing audio equipment today means moving beyond the VTVM test range. Disturbing distortions are not always evident on the indicator of a meter. Frequently a scope/audio oscillator troubleshooting technique is needed. Understanding the use of this more sophisticated test equipment will enable technicians to satisfy the discerning ears of present-day hi-fi owners. See article starting on page 36.

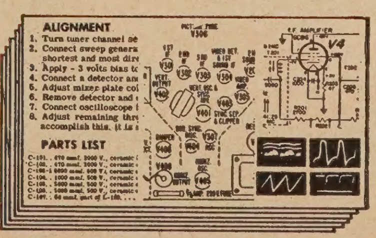
FEATURES AND ARTICLES

"Don't be a Vidiot!" (Editorial) 33
"Tuning in the Picture" 34
Audio Troubleshooting with a Scope . . . . . *R. G. Middleton* 36
"Tough Dog Corner" . . . . . *H. E. Chace, F. A. Salerno* 39
Conquer Obscure Video Defects . . . . . *Ray Mansfield* 40
Choosing a Mobile Radio System . . . . . *Allan Lytel* 42
Computer Analyzes Human Heartbeat . . . . *The National Bureau of Standards* 45
Approach to Printed Circuit Servicing . . . . . *Bernard Green* 46
What's Your Service Score? . . . . . *E. W. Fair* 48
Master Television Antennas 49
Building a Technical Library 52
Free Literature 56
Shop Hints . . . . . *A. J. Krukowski* 66
New Tubes and Components 68
New Audio Products 70
Microphone Loading 96

DEPARTMENTS

Editor's Memo 4
Letters to the Editor 8
News of the Industry 18
Reps. and Distrs. 25
Catalogs and Bulletins 28
Calendar of Coming Events 35
New Products 56
Audio Newsletter 88
Association News 93
New Books 100

CIRCUIT DIGESTS 105



IN THIS ISSUE

(16 pp. latest schematics—see last page)

ADMIRAL: TV chassis 17Z3DBM, 17Z3DBN

FISHER: FM-AM Stereo Receiver Model 600

MAGNAVOX: TV Chassis 32 Series

PHILCO: TV Chassis 10H25, 10H25U, 10H25R

VOCALINE: Citizens Band Transceiver Model ED-27

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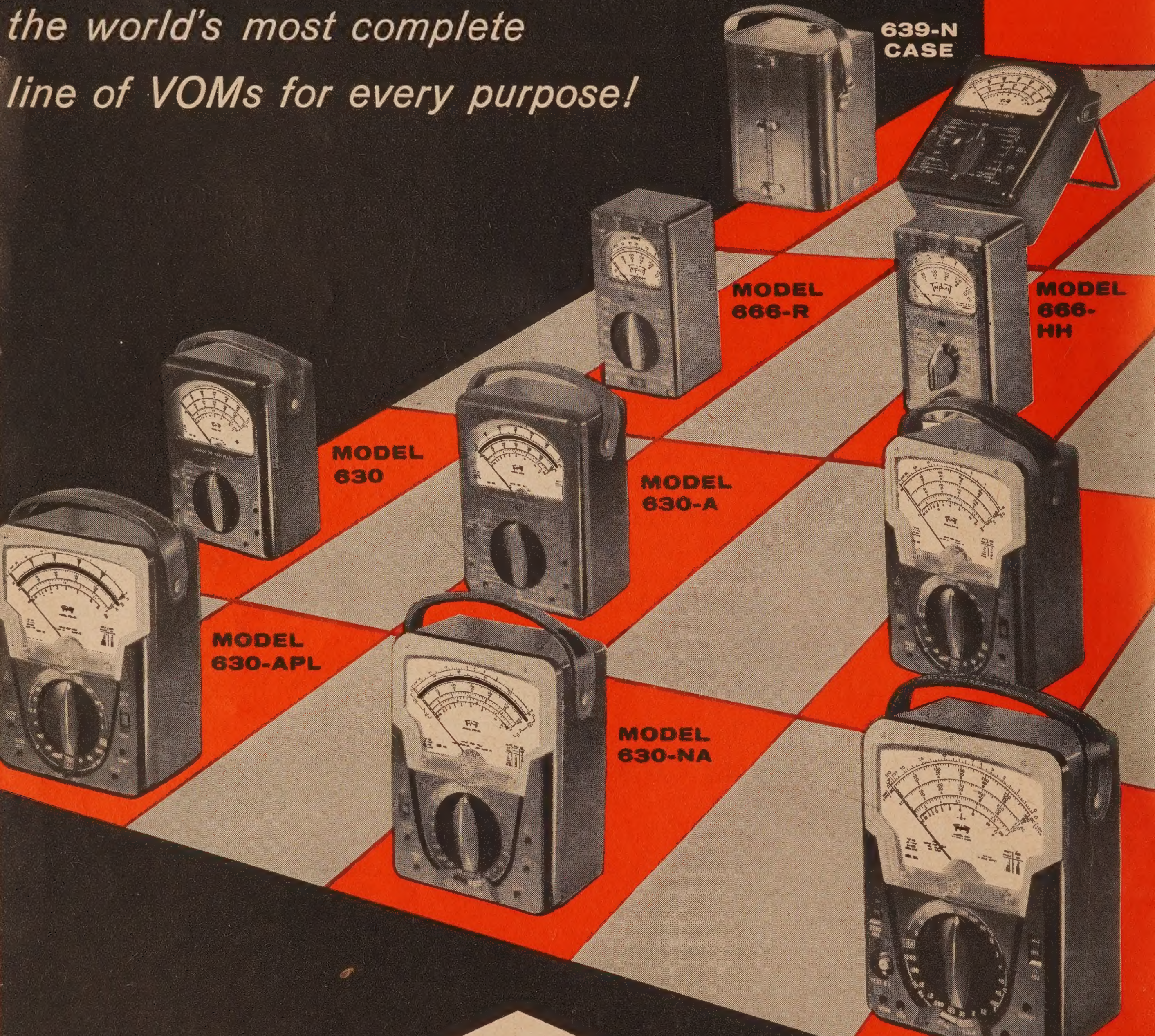
the world's most complete
line of VOMs for every purpose!


639-N CASE
MODEL 666-R
MODEL 666-HH
MODEL 630
MODEL 630-A
MODEL 630-APL
MODEL 630-NA

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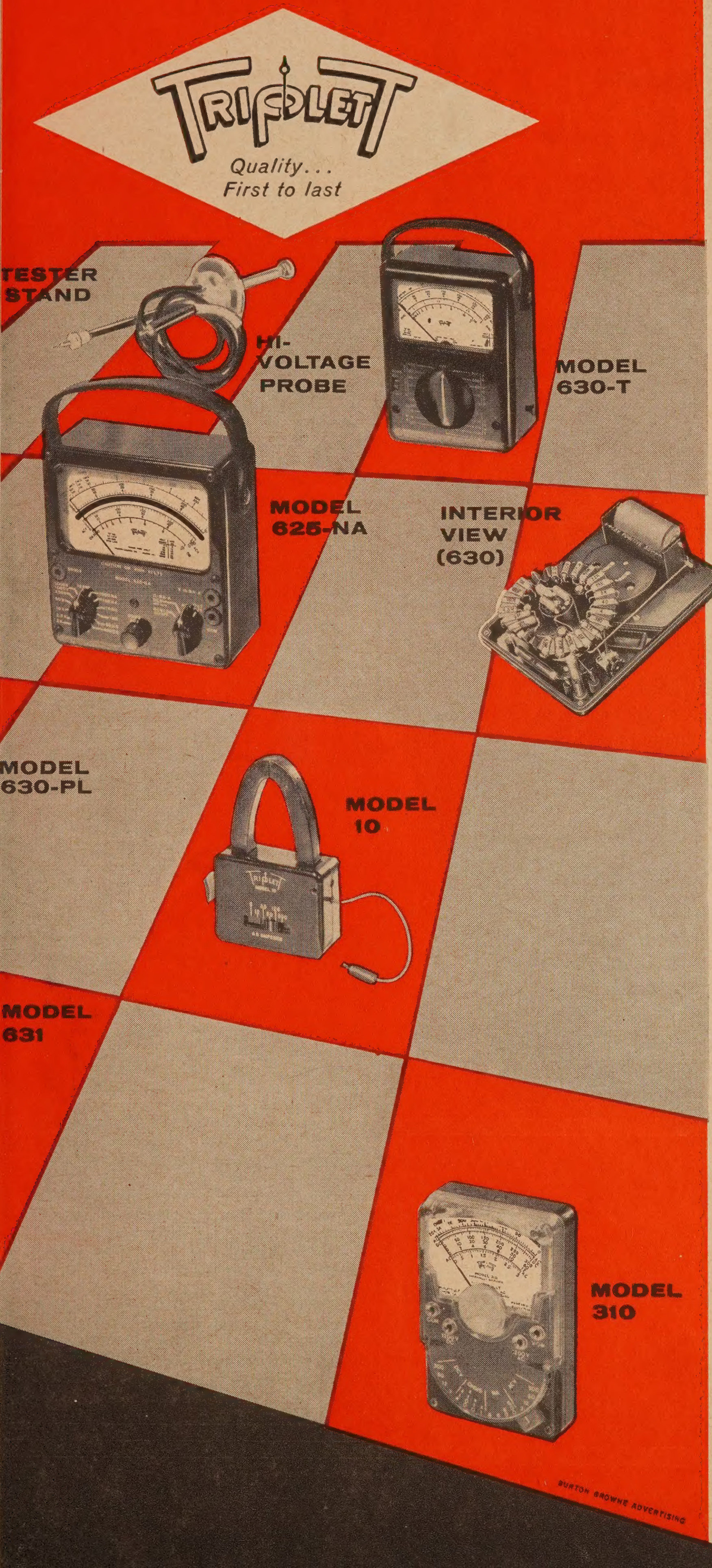
Quality . . .
First to last

TRIPLETT ELECTRICAL INSTRUMENT COMPANY
BLUFFTON, OHIO



Model 639-N Case $9.50. Handsome, black cowhide leather. Center-cover flaps snap back for full view of scales and complete access to instrument without removal from case.

Model Pt. T-225-A-33 Tester Stand $0.50. Metal, holds tester in approximately 45° angle; facilitates easy reading.

Probe for High Voltage Testing $14.50. For models 630, 630-A, 630-PL, 630-APL, and 631. Completely insulated polystyrene; guard-type handle. 11¾" long; 48" hi-voltage wire lead with banana plug at tester end. Available in 0-12,000 AC or DC volts, and 0-30,000 AC or DC volts.

Model 630-T $54.50. Specially designed for telephone maintenance. 2% accuracy on DC. Fused protected circuit protects resistors and meter in ohms ranges. Special neck strap holds instrument, freeing both hands. Banana jack connectors eliminate all shock hazard. Completely insulated case protects from ground.

Model 666-R Pocket VOM $29.50. Hand size, ideal for electrical maintenance. With recessed range knob it fits easily into case. AC rectifier pre-calibrated unit for easy replacement. Banana jacks at panel top prevent leads falling over meter dial. Single king-size selector switch minimizes incorrect settings, burnouts. Molded case streamlined, fully insulated.

Model 666-HH Pocket VOM $27.50. Compact, hand-size; 3" meter integral with panel, adjusted to 400 microamperes at 250 millivolts. Only 3 jacks necessary for all ranges. 19 ranges.

Model 625-NA $54.50. Dual sensitivity for extra ranges; large mirror scale for super readability. 3-color meter scale 5" long. 6" instrument, 0-50 microamp. AC volts at 10,000 O/V for checking many audio and high impedance AC circuits usually requiring VTVM. 38 ranges. Molded insulated case.

Interior View showing advanced engineering features of all Triplett VOMs. Molded mounting for resistors and shunts allows direct connections without cabling. Eliminates shorts. Longer life.

Model 630 $44.50. Popular, streamlined; long meter scales for easy reading. Outstanding linear ohm scale; low reading .1 ohm, high 100 megs. Single king-size selector-switch minimizes incorrect settings, burnouts. High sensitivity: 20,000 ohms per volt DC; 5,000 AC. Molded, fully insulated case.

Model 630-A $54.50. Laboratory type; ½% resistors for greater accuracy. Long mirrored scale eliminates parallax. Banana jacks, low resistance connections; high flux magnet increases ruggedness. Single king-size selector switch minimizes incorrect settings, burnouts. Molded fully insulated case.

Model 630-PL $44.50. Instant-vision, wider spread scales; streamlined case; handsome modern design. Unbreakable window. Outstanding linear ohm scale; low reading .1 ohm; high to 100 megs. Single king-size selector switch minimizes incorrect settings, burnouts. 5 to 500,000 cps frequency response in AC measurements. DC Polarity Reversing switch. High sensitivity: 5,000 ohms per volt AC; 20,000 ohms per volt DC.

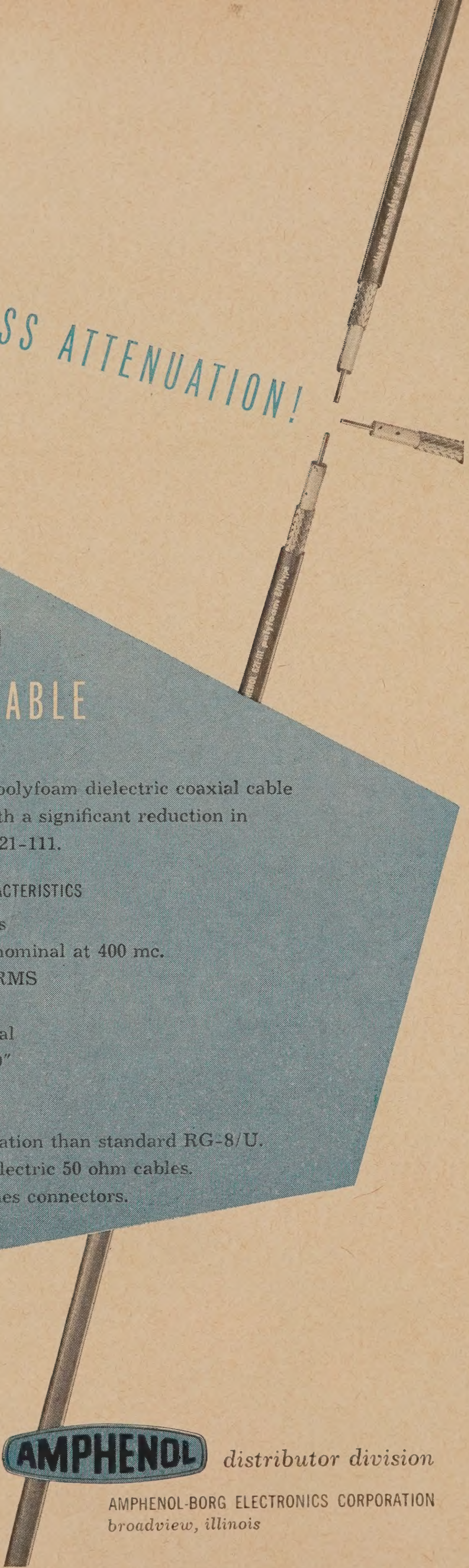
Model 10 Clamp-On Adapter $14.50. Checks line loads with model 310 (can also be used with 6 other models). Instant, accurate, safe. No circuit breaking or work interruption Easy range switching. Available in 6 AC Ammeter ranges: 0-6-12-30-60-120-300. Clips around single wire to read AC. Amperes direct. Use with adapter 101 to instantly divide 2-conductor cords. Molded case fully insulated, black plastic with engraved white markings.

Model 630-APL $54.50. Laboratory type with ½% resistors, more accurate movement. Long mirrored scales eliminate parallax. Unbreakable window. Single king-size switch minimizes incorrect settings, burnouts. 5 to 500,000 cps frequency response in AC measurements. DC Polarity Reversing switch. High sensitivity: 5000 ohms per volt AC; 20,000 ohms per volt DC. Molded case fully insulated.

Model 630-NA $74.50. Super DeLuxe with 70 ranges—nearly double conventional types. Frequency compensated from 35 cps to 20 kc. Temperature compensated. Accurate within 1½% full scale reading on DC. Large open front meter easy to read. Unbreakable window. Mirrored scale. Meter protection against overloads. Molded fully insulated case.

Model 631 Combination VOM and VTVM $64.50. Two fundamental units at the price of a single tester. The No. 1 instrument for all electronic men. Battery operation assures VTVM stability and long life. Sensitivity PLUS. 1.2 volt (VTVM) range is equal to more than nine million ohms per volt. Large easy to read meter with unbreakable face. Single king-size selector switch minimizes incorrect settings, burnouts. Molded case fully insulated.

Model 310 $34.50. The only complete miniature VOM with 20,000 ohms per volt and selector range switch. Self-shielded against strong magnetic field. Rugged, high torque, bar-ring instrument. Unbreakable plastic meter window. Converts to common probe—frees one hand—by fitting interchangeable test prod into top. Standard sensitivity 20,000 ohms per volt DC, and 5,000 ohms per volt AC. Accuracy 3% DC. Molded fully insulated case.



12% TO 15% LESS ATTENUATION!

polyfoam

RG-8/U TYPE CABLE

DESCRIPTION

AMPHENOL introduces a new polyfoam dielectric coaxial cable equivalent of RG-8/U but with a significant reduction in attenuation. Part number is 621-111.

ELECTRICAL AND MECHANICAL CHARACTERISTICS

Impedance—50 ohms ± 2 ohms
Attenuation—4.0 db/100 feet nominal at 400 mc.
Dielectric Strength—5000 V. RMS
Corona—3000 V. RMS
Capacity—26.0 mmf/ft. nominal
Overall Diameter—.405" ±.010"

FEATURES

From 12% to 15% less attenuation than standard RG-8/U.
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Used with standard UHF Series connectors.

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Distributor!

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broadview, illinois

Editor's Memo

Half of an editor's job is getting correct information for his readers. The other half of the job is keeping incorrect information out of the magazine.

A typical blooper is one we made in September. We labeled a series connected meter as a voltmeter. Back to electronic kindergarten for us. As you would expect, it should have been tagged ammeter. Voltmeters, we recall someone telling us many years ago, must be shunt connected.

There is one publication we read which refuses to recognize when it has gone off half cocked. It's *Consumer Reports*, published by the product rating organization, Consumers Union. Their October issue, for example, contains an article entitled, "The Case of the Televiewing Guinea Pigs." The victims are supposed to be consumers who buy TV sets with printed circuits.

There was a time when a number of manufacturers were producing some real printed circuit dogs. That was when everybody's voice was needed to protest an outrageous design. Where were you then, CU? Now, after manufacturers have made such major improvements as schematics on the printed circuit board, snapout boards for easy accessibility, frames for rigid supports, stronger bonding, etc., CU complains. Now, after technicians sweated to learn how to cope with printed circuits, and specialized tools have become available, CU tells its readers how difficult servicing is.

What CU does not say is that TV, almost alone among all consumer products, is giving much more at lower cost than 10 years ago. A bulky 10-incher used to cost $350 and up. Today, a compact 21" set with low noise tuner, brighter picture and other improvements may be obtained for under $200.

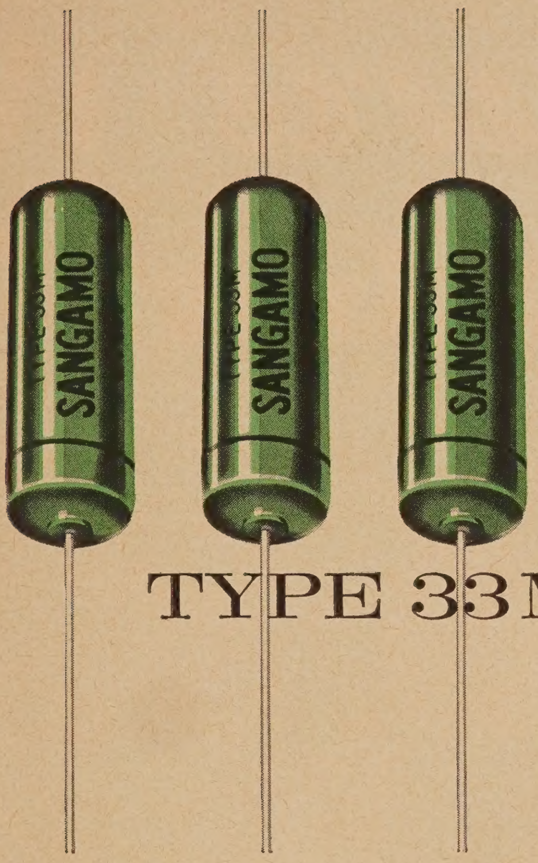
In any case, even if CU disagrees with us, they might at least have the courtesy to answer our letter.

When an editor isn't grousing, he's either pecking away furiously at some defenseless typewriter or blue-penciling some author's painstakingly crafted words. But if he's worth his salt, the editor does it for one reason—to get the best damn story for his reader.

When an editor is out nosing about, a typical kick-off question is: "How's business?" If an editor lands on your doorstep with this poser, you might explain to him, as was told to us:

My business is like loving. When it's good, it's wonderful. And when it's bad —it's still pretty good.

Al Forman



utmost in performance

TYPE 33M

MOLDED mylar* CAPACITOR

applications | *computers • instrumentation • test equipment*
filter networks • transistor circuitry • amplifiers

Sangamo Type 33M molded mylar* capacitors combine the excellent electrical performance characteristics of mylar* dielectric material with a molded case of high moisture resistant thermosetting plastic.

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Dissipation Factor: The dissipation factor of the Type 33M capacitor does not exceed 1% at normal equipment operating temperature over the complete audio frequency range.

Tolerances: Available in capacitance tolerance values of ±5%, ±10%, ±20%.

Life Test: These units will withstand a life test of 250 hours at 125% of rated voltage at 85°C. Life tests at 125°C. should be made at 125% of the derated voltage.

Dielectric Absorption: Dielectric absorption of Type 33M capacitors is less than half that of oil impregnated paper capacitors.

Moisture Resistance: Type 33M capacitors will successfully withstand the moisture resistance tests specified in Spec. MIL-C-91A.

Insulation Resistance: The insulation resistance of these capacitors will exceed 5,000 meg/mfd. over the normal operating temperature range.

- Write for engineering bulletin TSC-206A

*DuPont's trademark for polyester film.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

SC-59-6

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These leading TV stars are appearing in Winegard national ads in

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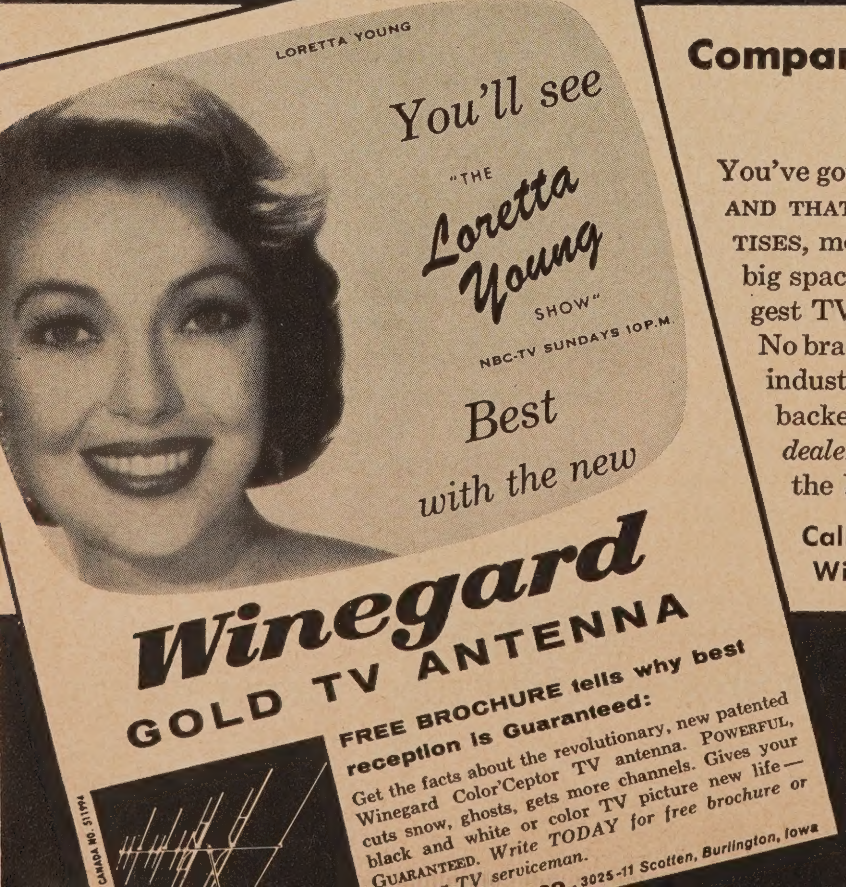
BETTER HOMES & GARDENS
FARM JOURNAL

★ *Steve Allen*

★ *Ward Bond*



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Get the facts about the revolutionary, new patented Winegard Color'Ceptor TV antenna. POWERFUL, cuts snow, ghosts, gets more channels. Gives your black and white or color TV picture new life—GUARANTEED. Write *TODAY for free brochure or* TV *serviceman.*

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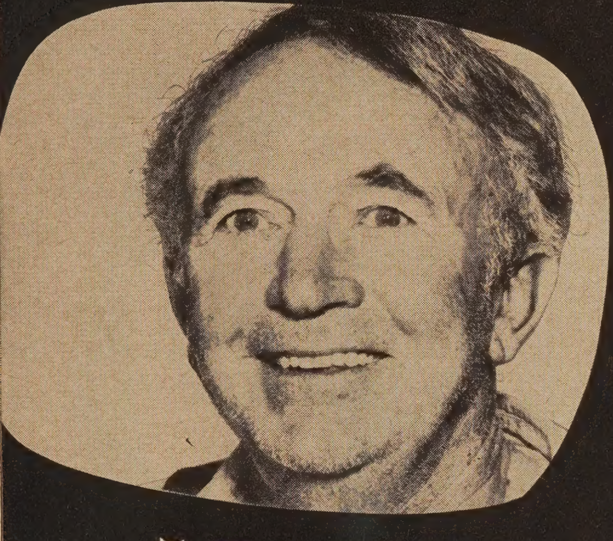
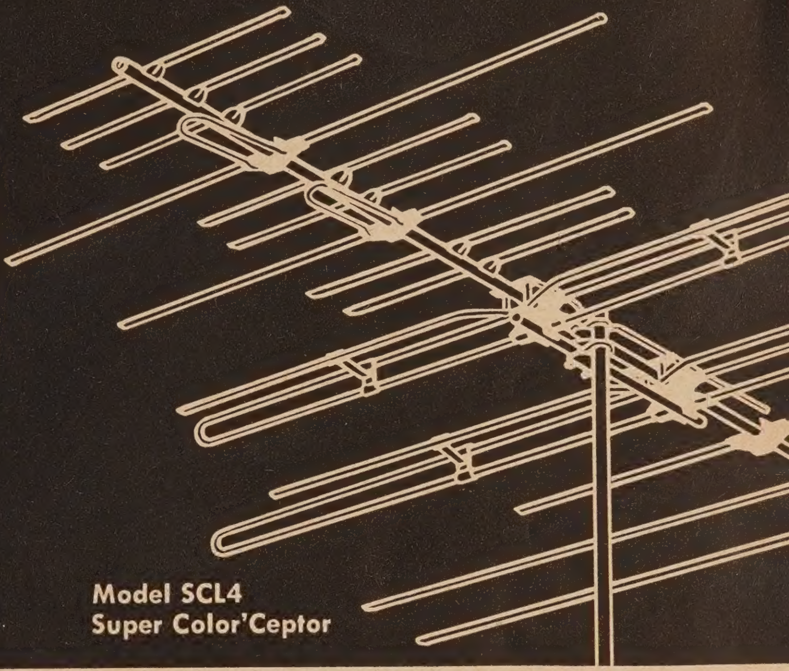


★ *Walter Brennan*



Model SCL4
Super Color'Ceptor

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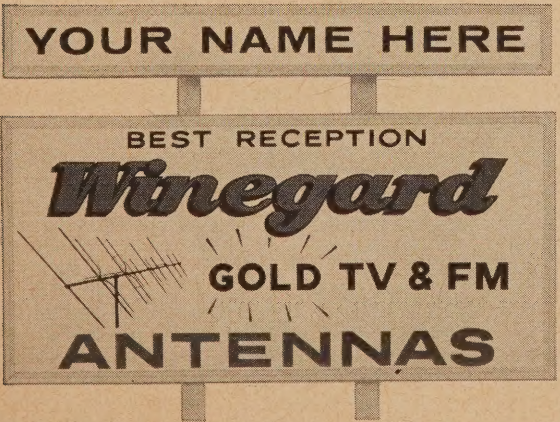


FREE GIANT ROAD SIGN

With every Color'Ceptor antenna you buy, you get a *Free* promotion buck. Use your promotion bucks to get the sales aids that will help you most.

Metal Road Sign, Illuminated Window Sign, Metal Store Front Sign, Silk Wall Banner, Balloons, Shirt Emblems, Truck Decals, Full Color Postcards and Mailing pieces, Gold Anodized display pole.

And who offers the best of all TV antennas—PROVED—GUARANTEED?

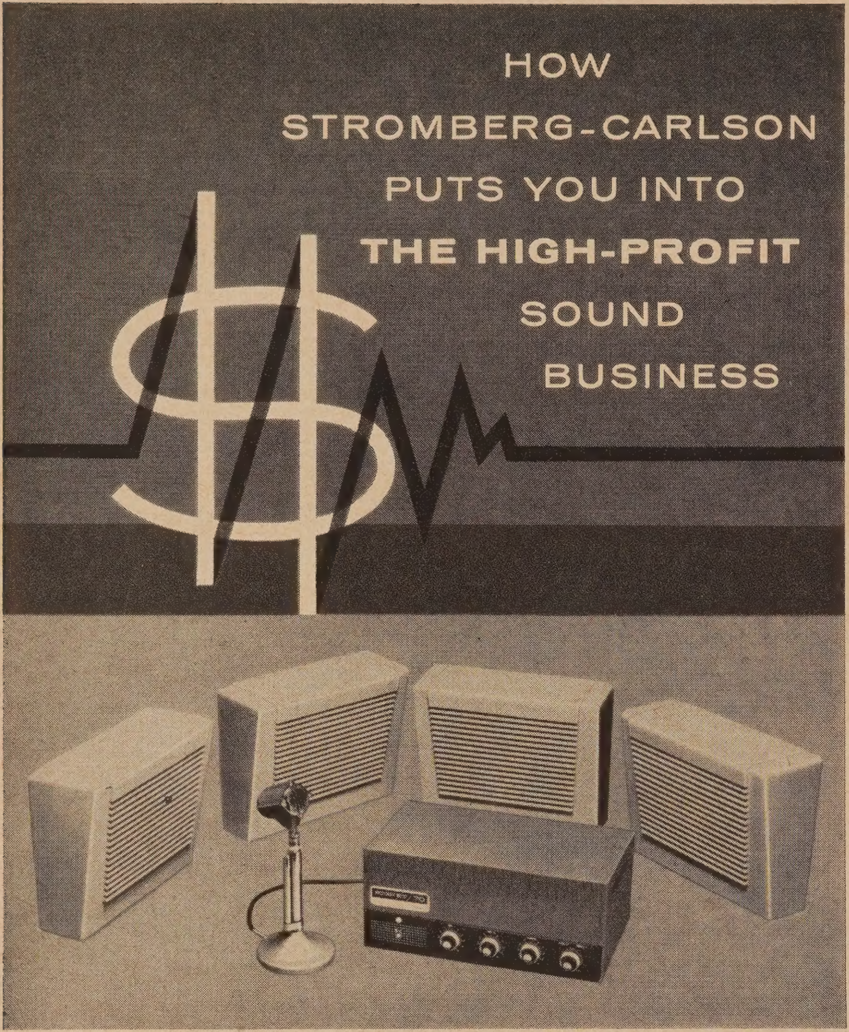
Leading Consumer Research Organization Confirms what the World Already Knows—

It's Winegard COLOR'CEPTOR!

SELL THE LINE THAT REALLY HELPS YOU SELL!

Winegard

Feature the Leader and BE one!



Illustrated: One of many typical SIGNET assemblies.

Tired of the old service-bench grind?

Here's your chance to get into a clean, high-profit business—selling SIGNET SOUND by Stromberg-Carlson.

Customers? You'll find plenty of them right in your own neighborhood. Taverns, restaurants, clubs, meeting halls, churches, —you can think of many more yourself.

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STROMBERG-CARLSON

A DIVISION OF **GENERAL DYNAMICS**

LETTERS

To the Editor

Interference Repair

Editor, Electronic Technician:

Many of my customers were complaining about TV interference in one section of this city. I asked them to check with their neighbors when the interference started to see if an FM radio was being used. Not having any success with this method, I took a field strength meter, inverter and a folded dipole antenna on my truck and rode through the streets of the interference area until I finally reached the right house. Checking over the set, I found a defective 6J6 tube in the booster. After replacing this tube there weren't any further complaints of this nature.

Charles St. Jean

St. Jean Appliance Co.
Westfield, Mass.

● *A newspaper report of this successful radio sleuthing said that grateful residents of the area got together and showed their appreciation for uncovering the trouble source.—Ed.*

Stereo Sales

Editor, Electronic Technician:

Stereo has not hit my part of the country like I think it should and could. I feel the reason for this is because the public actually does not know enough about it. I am expanding my business with the intention of stressing stereo sales, and would like to inform the general public about it. I am convinced that if I could pass out booklets on stereo, it would create more interest for the buyer. I want you to know that I think the information from your magazine is invaluable.

Perry Griffith

Griffith Radio TV Sales & Service
Kermit, Texas

We Goofed

Editor, Electronic Technician:

Re the article, "Servicing Home Vacuum Cleaners," in the September issue, the text referring to fig. 2 states that if the winding is open, the lamp will not light. If I know my volt meters, an open winding is not the only thing that will keep the light from lighting. The resistance of the meter in series would play a part in preventing the lamp from lighting. In spite of this, I really do like your publication!

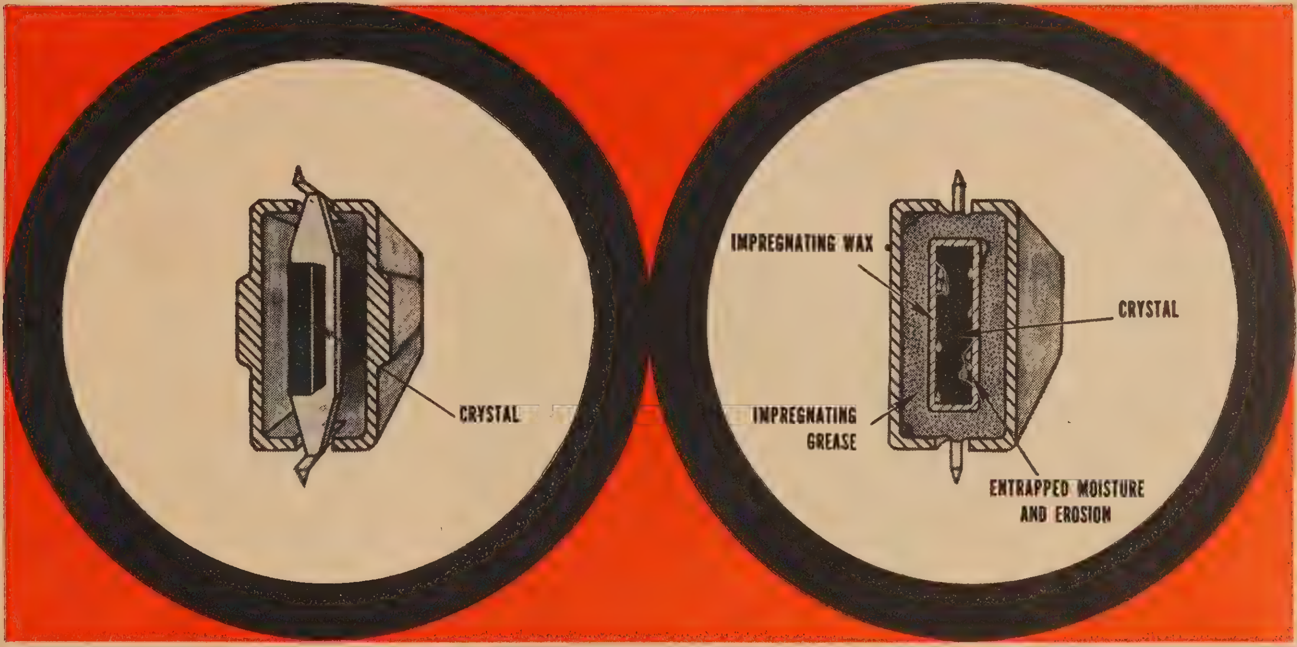
John H. Leacock

Lincoln, Nebraska

● *Is our face red! The meter in series should have been labeled "ammeter."—Ed.*

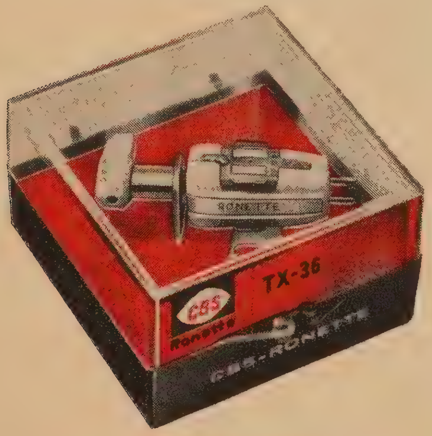
(Continued on page 12)

CBS® Ronette Cartridges cut call-backs ...because they breathe



CBS-RONETTE CARTRIDGE
Specially grown crystal is unimpregnated, exposed to atmosphere, breathes, and remains intact.

OTHER CARTRIDGES
Ordinary crystal is not impervious to moisture, must be impregnated, is gradually destroyed by trapped moisture.



OTHER CBS-RONETTE ADVANCED ENGINEERING FEATURES

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- Precision-polished jeweled styli throughout line.
- Simplified line . . . 27 models replace 500.
- Exact replacements for over 6,000,000 cartridges.

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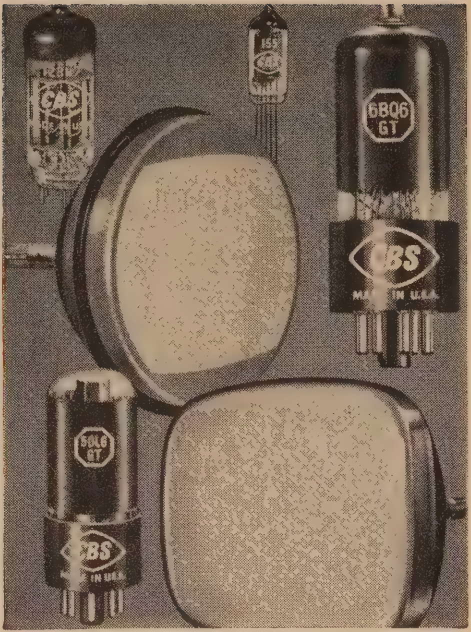
CBS ELECTRONICS
Danvers, Massachusetts
A Division of Columbia Broadcasting System, Inc.

CBS FIRSTS IN TUBES



FIRST Bantam GT receiving tubes

FIRST Bantam Jr. subminiature tubes

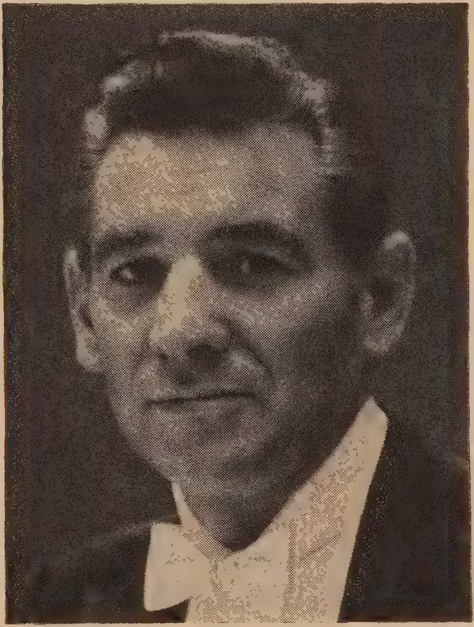
FIRST rectangular picture tubes

FIRST receiving tubes designed especially for TV

FIRST receiving tubes rated for Continuous Television Service

FIRST practical color picture tube, CBS-Colortron

CBS FIRSTS IN COLUMBIA RECORDS



Leonard Bernstein, outstanding musical personality, is a Columbia Records star.

FIRST double-faced phonograph disc

FIRST (LP) long-playing record

FIRST complete symphony recording in U. S. A.

FIRST "360" hi-fi phonograph

FIRST major recording company with a record club

FIRST Stereo Seven — new seven-inch 33⅓ rpm record

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tube
CBS
tube
Guaranteed by Good Housekeeping

Receiving, industrial and picture tubes • transistors and diodes • audio components • and phonographs

WHAT THESE FIRSTS MEAN TO YOU

In records or tubes, the CBS family habit of being first helps guarantee you the quality of performance that only leadership can deliver. This leadership is your further assurance that:

- *CBS tube quality cuts call-backs to the bone.*
- *CBS tube quality insures your customers of dependable performance.*
- *CBS tube quality offers built-in profits for you.*

Ask for the leader with the top-rated name your customers know and trust. Ask first for CBS.

CBS ELECTRONICS

Danvers, Massachusetts

Electronic manufacturing division of Columbia Broadcasting System, Inc.

HARMONY
CBS ELECTRONICS

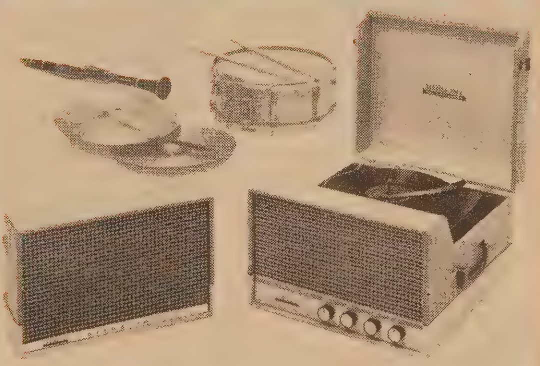
Portable Hi-Fi Stereo with Console Sound

Independent Service-Dealers! This is Your line...

YOUR PROFIT OPPORTUNITY

Again CBS Electronics makes it possible for you to expand your business with a dependable product that fills a popular demand. Harmony Phonographs are engineered to uphold your position in the community as an expert consultant on outstanding value in audio equipment. You can choose from three stereophonic and two monophonic portables, in decorator styles, and priced to sell under $100.00.

Model **208**, Stereophonic Portable, **$39.95***
So much for so little... a value that you can recommend with confidence. Amazing realism! Has three-speed turntable, True-Track tone arm, and CBS-Ronette high compliance turnover cartridge with jeweled styli.



Model **224**, Automatic Stereophonic Portable, **$99.95***
Big console performance. Has a modified simplex push-pull amplifier developed by CBS Laboratories, balanced woofers and tweeters, high fidelity Columbia CD cartridge with foolproof single jeweled stylus, nonresonant tone arm, treble and bass gain controls, ten watts total peak output, and CBS tubes. Plays records of all speeds automatically.

**Suggested retail price. Slightly higher west of the Rockies.*

Identify yourself as a Harmony Phonograph dealer. Get your Harmony Phonographs, attractive consumer line folders and many other sales helps from your distributor.

Or, mail coupon today.

CBS ELECTRONICS
Danvers, Massachusetts
A Division of Columbia Broadcasting System, Inc.

CBS ELECTRONICS
Danvers, Massachusetts

Gentlemen:

Please send me the Harmony Phonograph consumer line folder, dealer helps booklet, and the name of my nearest distributor.

Name...
Address..
City.......................................Zone.....
State..

(Continued from page 8)

Factory Service

Editor, ELECTRONIC TECHNICIAN:

I wish to call your attention to the Factory Service item which appeared in your September issue on page 37. In particular, we wish to take exception to the statement: "Factory service operations have been dropped by Westinghouse TV-Radio Set Division." Since the Westinghouse TV-Radio Div. has never engaged in "factory service"—or any other form of captive service—it would be impossible for us to drop such operations. Our policy has always been one of containment within the realm of a manufacturer's service obligations to our customers. We have found that the same independent service technicians who made the fantastic growth of the television industry possible from its infancy are qualified and capable of providing first rate service to our consumers. In fact, we feel so strong on this score, that we are presently engaged in a program to authorize many additional independent service companies for work on our products.

As pointed out in your article, we are franchising additional independent parts jobbers to handle our parts in outlying markets not presently serviced by our regular distributors. This will eliminate many of the parts procurement problems which have plagued the independent service technician in the past.

K. H. BROWN, Manager
Headquarters Service
Westinghouse TV-Radio Div.
Metuchen, N.J.

Antenna Claims

Editor, ELECTRONIC TECHNICIAN:

For some time I have been bothered by the cockeyed claims of the antenna manufacturers. Couldn't you work out some standard measurements, It is high time some sort of brake is applied. They make claims, but none of them actually make any direct comparative statements of their product's characteristics.

THOMAS C. RUMNEY
Toronto, Canada

Reader Confused

Editor, ELECTRONIC TECHNICIAN:

I'd like to purchase some basic testing equipment. I'm at a loss concerning dollar-for-dollar value. Do you have an impartial Buyer's Guide to aid me in making a decision?

EDWARD HRVOICH
Baden, Pa.

● *Electronic Technician has published many articles covering the use of various instruments and surveys listing specifications. Individual features will not appeal equally to all persons. Therefore, it's improbable that a "best-buy" type guide can actually be impartial. A good guide for purchasing test instruments is: Know your personal needs, review the ads and brochures offered by various manufacturers and discuss the problem with a local electronics distributor carrying a variety of brands. Purchasing an instrument of a reputable manufacturer will further insure good value for your money.—Ed.*

TV REPAIR MADE EASY
REPAIR SHOPS
marvin TOWNSEND

Mr. Service Dealer...
in CR Tubes Philco offers you
Double Protection
with Bond and Warranty

ALL NEW . . . Electron Gun
ALL NEW . . . Exclusive Phosphor Coating
ALL NEW . . . Long Life Filaments
ALL NEW . . . Super Efficient Cathode
ALL NEW . . . Focusing Anodes
ALL NEW . . . Aquadag Shell Coating

Quality Tested—
Life Tested

Insist on Genuine
PHILCO®
Star Bright 20/20
ALUMINIZED
PICTURE TUBES

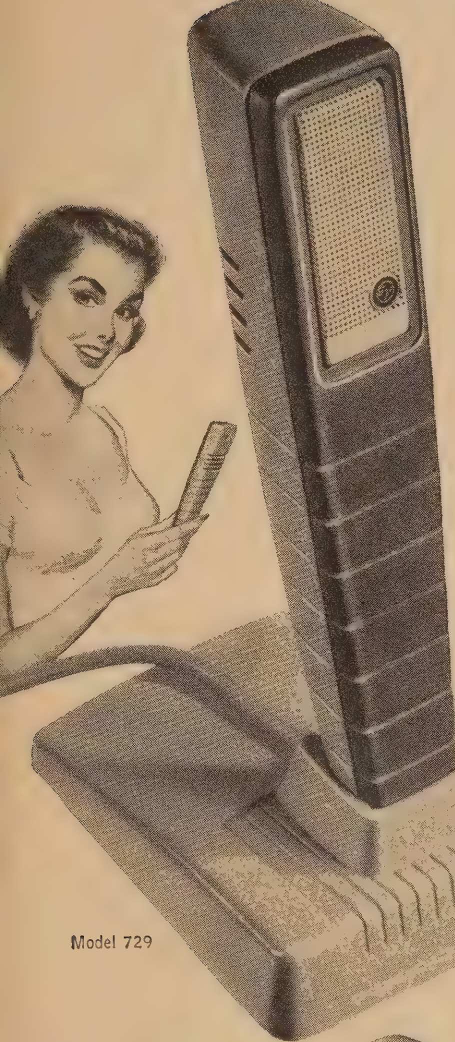
SENSATIONAL FREE OFFERS!
PHILCO PROFIT WHEEL PROGRAM
Get All of the Details From Your Local Philco Distributor

PHILCO ACCESSORY DIVISION
WORLD-WIDE DISTRIBUTION

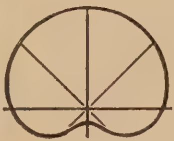
FIRST CARDIOID AT SUCH LOW COST!

CUTS BACKGROUND NOISE

Accepts Only the Sound You Want



Model 729

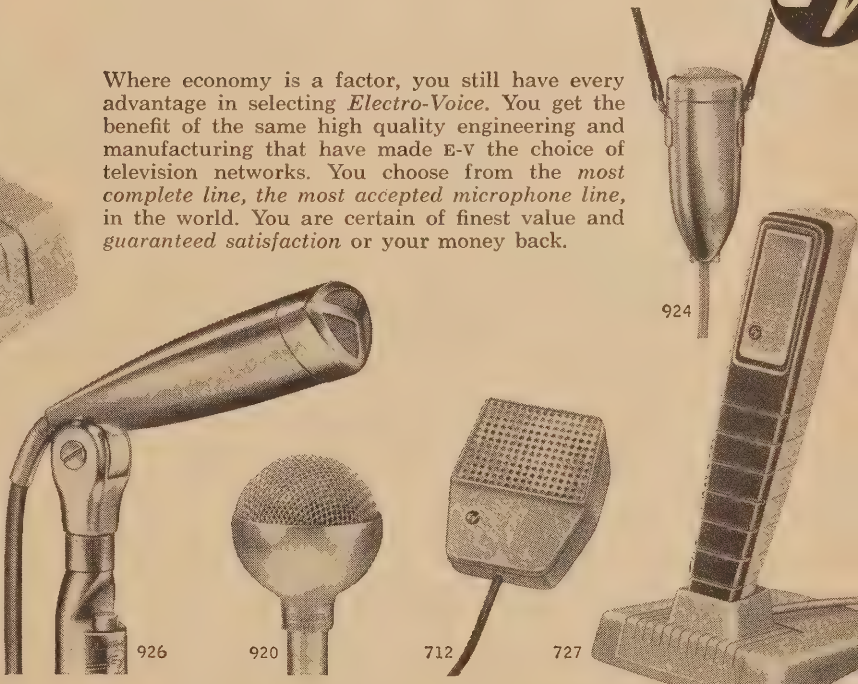


Typical Cardioid Polar Pattern

IDEAL FOR STEREO RECORDING OR PUBLIC ADDRESS

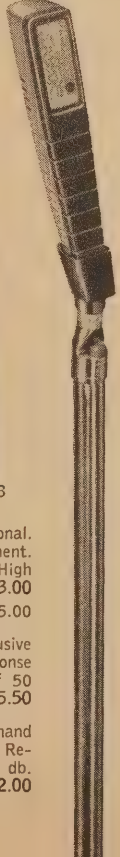
Unidirectional pick-up and tailored response of the *new E-V 729 Cardioid* make it economically ideal for many applications in public address, paging, dictating, home recording, amateur communications, and other sound use. The 729 Cardioid *rejects unwanted rear-background noise and room reverberation.* Permits working from nearly twice the distance of conventional microphones. *Reproduces only the sound you want,* more faithfully and distinctly. Instantly slips in or out of desk-base supplied with microphone. Feels good in the hand.

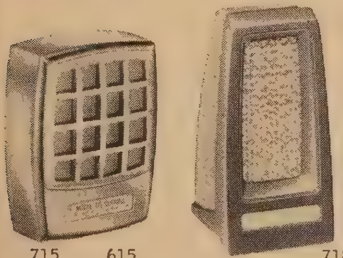
Where economy is a factor, you still have every advantage in selecting *Electro-Voice.* You get the benefit of the same high quality engineering and manufacturing that have made E-V the choice of television networks. You choose from the *most complete line, the most accepted microphone line,* in the world. You are certain of finest value and *guaranteed satisfaction* or your money back.



Model 729 Cardioid Ceramic. Complete with desk-base and floor stand adapter. Ceramic generating element withstands extremes of temperature and humidity. Response 60-8000 cps. Output —55 db. High impedance. Two-tone gray.
List Price, $24.50

Model 729S. With switch. List, $26.50





Model 715 "Century" Ceramic. Non-directional. For table, stand or hand. Ceramic element. Response 60-7000 cps. Output —55 db. High impedance. Satin chrome. **List, $13.00**

Model 715S. With switch. List, $15.00

Model 615 "Century" Dynamic. Has exclusive indestructible Acoustalloy diaphragm. Response 80-8000 cps. Output —55 db. Choice of 50 ohms or high impedance. **List, $25.50**

Model 718 Ceramic. Non-directional. For hand or table use. Ceramic generating element. Response 60-6000 cps. Output level —55 db. High impedance. **List, $12.00**

CHOOSE FROM THESE AND OTHER E-V LOW COST MICROPHONES

Model 926 Slim Crystal. For hand or stand use. Non-directional. Moisture sealed crystal. Response 60-8000 cps. Output —60 db. High impedance. Tiltable head. Satin chrome. **List, $29.50**

Model 920 "Spherex" Crystal. All-direction pickup. Moisture sealed crystal. Response 60-7000 cps. Output level —50 db. High impedance. Satin chrome finish. **List, $27.50**

Model 712 Compact Ceramic. Fits comfortably in the hand. Non-directional. Response 70-7000 cps. Output —55 db. High impedance. Gray Styron case. **List, $7.50**

Model 924 Lavalier Crystal. For chest or hand use. Non-directional. Moisture sealed crystal. Response 60-8000 cps. Output —60 db. High impedance. With neck cord, support clips, and cable. Satin chrome finish. **List, $20.00**

Model 727 Slim Ceramic. Instantly lifts out of base for hand use. Non-directional. Ceramic generating element. Response 60-8000 cps. Output —55 db. High impedance. Two-tone gray. With desk-base and floor stand coupler. **List, $18.00**

Model 727S. With switch. List, $20.00

Wide choice of Dynamic models, also available.

See Your E-V Distributor, or Write for Catalog No. 136 to Dept. 119-T

No Finer Choice than **Electro-Voice®**

ELECTRO-VOICE, INC., BUCHANAN, MICHIGAN, U.S.A.

STEAM

YOUR WAY TO *NEW* MARKETS...

WITH JFD ...the *quality* line!...

the *performance* line!...

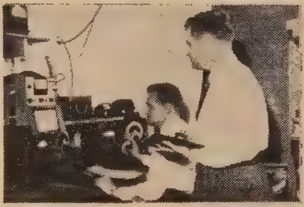
the *full* line!...

the *turnover* line!...

of TV and FM Antennas and Accessories that make you *thrive*—not just survive.

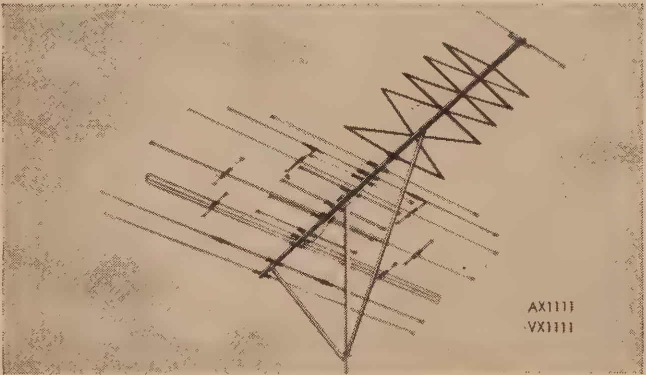
JFD *PAVES THE WAY TO SERVICE-DEALER PROFITS WITH...*

ANTENNA LINES THAT MAKE THE MASS-MARKET *YOUR* MARKET!



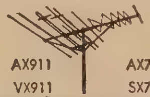
Outdoor or indoor, TV or FM, top, middle or low-end, JFD offers the industry's best construction and engineering advantages in *all* models, *all* prices.

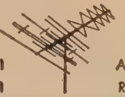
Each developed to perfection in the JFD Research Laboratories by the same engineering team responsible for precision electronic components now serving in America's most advanced weapon and industrial systems.

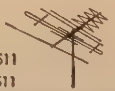


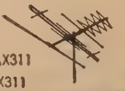
HI-FI HELIX COLORTENNAS

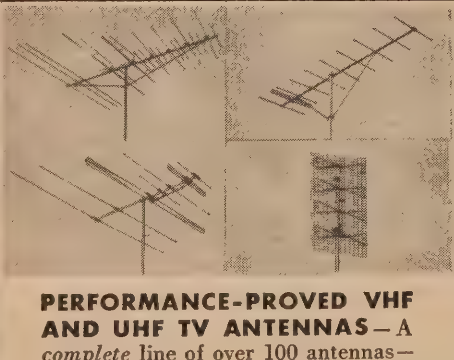
Five unique types with high-gain Satellite dipole and helix design—each geared to today's black and white, tomorrow's color requirements—in natural or eye-appealing gold anodized aluminum.

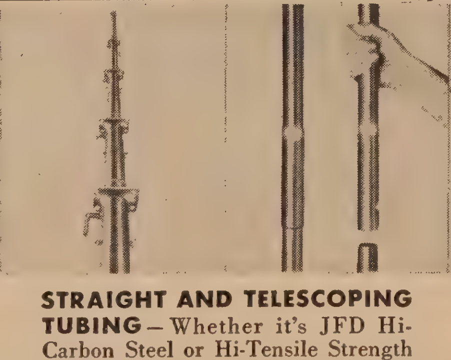

AX911
VX911

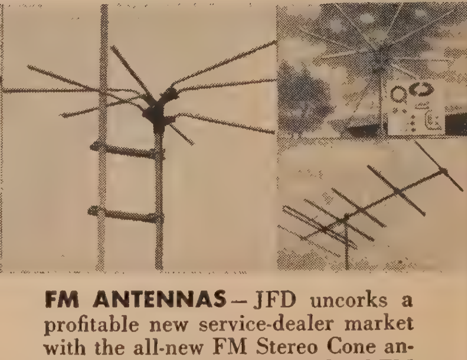

AX711
SX711


AX511
RX511


AX311
JX311







PERFORMANCE-PROVED VHF AND UHF TV ANTENNAS—A *complete* line of over 100 antennas—from the VHF Banshee, Fireball and 5 and 10-element Yagis to the UHF Translator—a line that fills all customer reception needs and *your* profit needs.

STRAIGHT AND TELESCOPING TUBING—Whether it's JFD Hi-Carbon Steel or Hi-Tensile Strength Aluminum Straights... or Armco Hi-Carbon Steel Telescoping Tubing, you can't buy better.

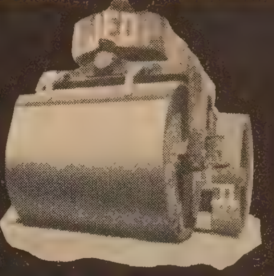
FM ANTENNAS—JFD uncorks a profitable new service-dealer market with the all-new FM Stereo Cone antenna concept. Five gold anodized FM antenna kits make every TV set owner, every hi-fi owner a customer.

SEE YOUR JFD DISTRIBUTOR NOW! GET YOUR FAIR SHARE OF TODAY'S 40 MILLION DOLLAR ANTENNA REPLACEMENT MARKET!

JFD ELECTRONICS CORPORATION 6101 Sixteenth Avenue, Brooklyn 4, New York

ROLL

FAT NEW PROFITS . . .



JFD EXPLODES NATION-WIDE TV ANTENNA SALES DRIVE THIS SEASON WITH HUGE ADVERTISING SPECTACULARS!

OPEN-THROTTLE ADVERTISING PRESELLS 20,000,000 PROSPECTS!

COAST-TO-COAST ABC-TV ADVERTISING ON THE ALCOA PRESENTS!

MONTH-IN MONTH-OUT SATURATION CAMPAIGNS IN

Progressive Farmer
LOOK
TV
FARM JOURNAL

PROGRESSIVE FARMER

FARM JOURNAL

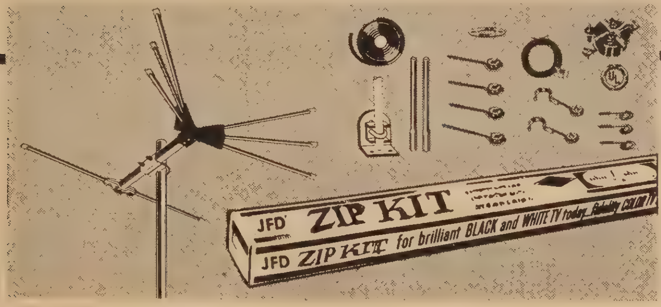
LOOK

TV GUIDE

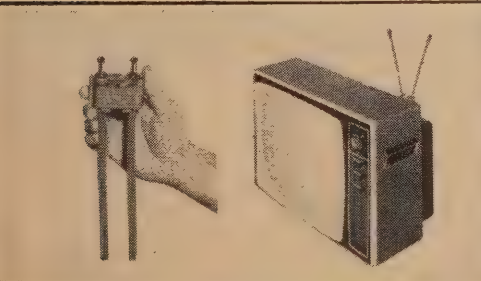
MAKING THE MASS MARKET JFD ANTENNA-CONSCIOUS!

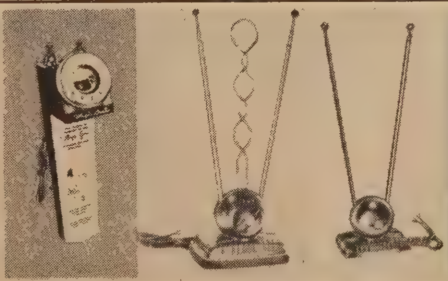
LOCAL TIE-IN CO-OP ADVERTISING TO HELP YOU CONVERT ANTENNA REPLACEMENT LEADS INTO SALES.

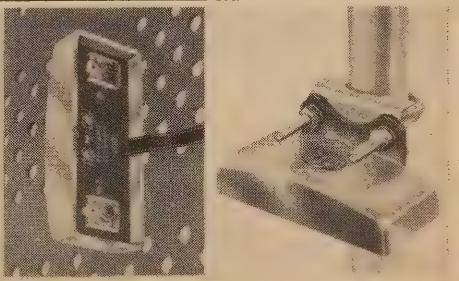
NEWSPAPER MATS, RADIO-TV SPOTS, POP DISPLAYS THAT PUT MUSCLE INTO YOUR LOCAL SALES DRIVES.


JFD ZIP KIT
JFD ZIP KIT for brilliant BLACK and WHITE TV today, Fidelity COLOR TV

The most complete line of **"DO-IT-YOURSELF" TV ANTENNA** installations in a package – the sensational-selling ***ZIP-KIT!*** . . . starting at $10.75, list.







EXACT REPLACEMENT TV ANTENNAS – Thousands of service-dealers are earning quick, clean profits in "portable" and "toteable" TV antenna replacements by specifying the JFD brand – the perfect "factory-spec" match. Soon to be listed in Howard W. Sams Photofact Index. Another vital new service market.

INDOOR TV ANTENNAS – First in sales! First in performance! Today's longest and strongest indoor VHF or UHF antenna line! And with good reason. None other offers the styling . . . the packaging . . . the merchandising you get from JFD.

SERVICE-SAVERS – The TV accessory line with "heart." Fifty labor-saving, money-making units to choose from – the trade's largest assortment – assure picture-perfect performance every time. For a handy profit-plus standardize on JFD set couplers, antenna couplers, switches, wave traps and lightning arresters.

Pioneers in electronics since 1929

JFD International, 15 Moore Street, New York, New York • **JFD Canada Ltd.,** 51 McCormack Street, Toronto, Ont., Canada

"TUBE INVENTORY DOWN 30%,

...from using General Electric's PROFIT* Program. That's the dollar-saving, income-building record of Chicago partners Robert Knudsen and Harold Russell!

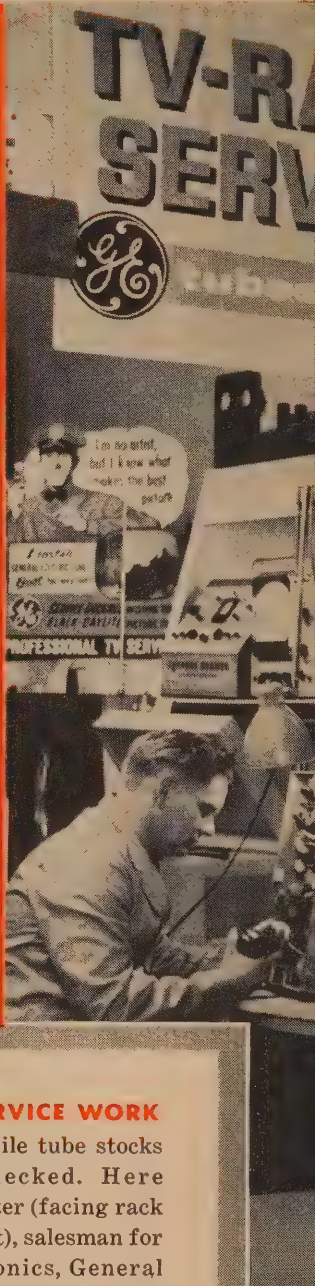
* Programmed Replenishment OF Inventory Turnover

"We're moving more tubes than ever, with a stock one-third less. Inventory turnover is that much higher, which shows in increased profits." The two busy partners of Tel-Rad TV Sales-with-Service, 5839 Belmont Ave., Chicago, name this as their principal benefit from General Electric's new PROFIT* Program.

Another big saving—space! The compactness of the General Electric Inventory Rack means that a service dealer can do away with 50 to 60 feet of shelving. Furthermore, the attractive, organized display of tubes gives the shop a modern and professional-looking appearance.

Knudsen and Russell add, "Now our tube stock's geared to our needs. And it stays that way—plenty of fast-selling types, a minimum of slow movers. The distributor's weekly re-order visit takes care of everything." No stock-taking or clerical work by the partners is involved. This saves them time for profitable repairwork.

You too can increase turnover and boost income with General Electric's new PROFIT* Program. Available with the purchase of tubes from your G-E tube distributor. See him today! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*



TEL-RAD'S SERVICE WORK doesn't stop while tube stocks are being checked. Here Richard Schlueter (facing rack in picture at left), salesman for Melvin Electronics, General Electric tube distributor, inspects the PROFIT* tube inventory for types to re-order. Schlueter does this job weekly, handling all routine and paperwork—thus saving valuable time for Knudsen and Russell.

Service Designed tubes
for any set!
Electronic TUBES

OUR SALES ON THE INCREASE!"

TV-RADIO SERVICE
tubes
tube
TV-RADIO SERVICE
tubes
SERVICE-DESIGNED tub
TV RADIO SERVICE
Best for any set!
WHAT! no t

Progress Is Our Most Important Product

GENERAL ELECTRIC

2-111-223

for the BEST in SERVICE
HI-Q .004

USE AEROVOX CERAMIC CAPACITORS!

If you're particular about your service . . . be particular about the capacitors you use. Aerovox offers you a complete line of rugged, dependable and versatile ceramic capacitors in every case style for every replacement application. Choose from a wide selection of disk types in bypass-coupling, general purpose, hi-voltage and temperature compensating. Three tubular types are available from general purpose to temperature compensating to hi-voltage units. For those special applications you have cartwheels, standoffs and feedthrus in all sizes and values. Your local Aerovox Distributor is your one-stop source of supply. Call on him today for any and all your capacitor needs. Ask him for your personal copy of the latest Aerovox Servicemen's Catalog.

BUY 'EM BY THE KIT...
two disk ceramic kits (AK-200 and AK-201HS) of popular replacement types in special 3 x 5 metal file drawers now available at your Aerovox Distributor. Pay for only the capacitors and get the file cabinet FREE.

AEROVOX CORPORATION
DISTRIBUTOR DIVISION
NEW BEDFORD, MASSACHUSETTS

News of the Industry

ALLEN B. DU MONT LABS. Electronic Tube Div. has named JOHN C. WOLKE as Distributor Sales Mgr.

INTERNATIONAL RECTIFIER CORP. appointed ANGUS SCOTT as Mgr. of the New England Area office.

SOLA ELECTRIC appointed JOHN B. O'DONNELL to the newly-created position of Distributor Sales Mgr.

BLONDER-TONGUE reports the appointment of HAROLD R. WALKER to the post of Chief Engineer of the Special Products Div.

CORNELL-DUBILIER will convert to a modern research and development laboratory its 100,000 sq.ft. plant at Norwood, Mass.

PHILCO CORP. and GENERAL TRANSISTOR CORP. have announced the signing of an engineering service and license agreement covering the manufacture and sale of transistors.

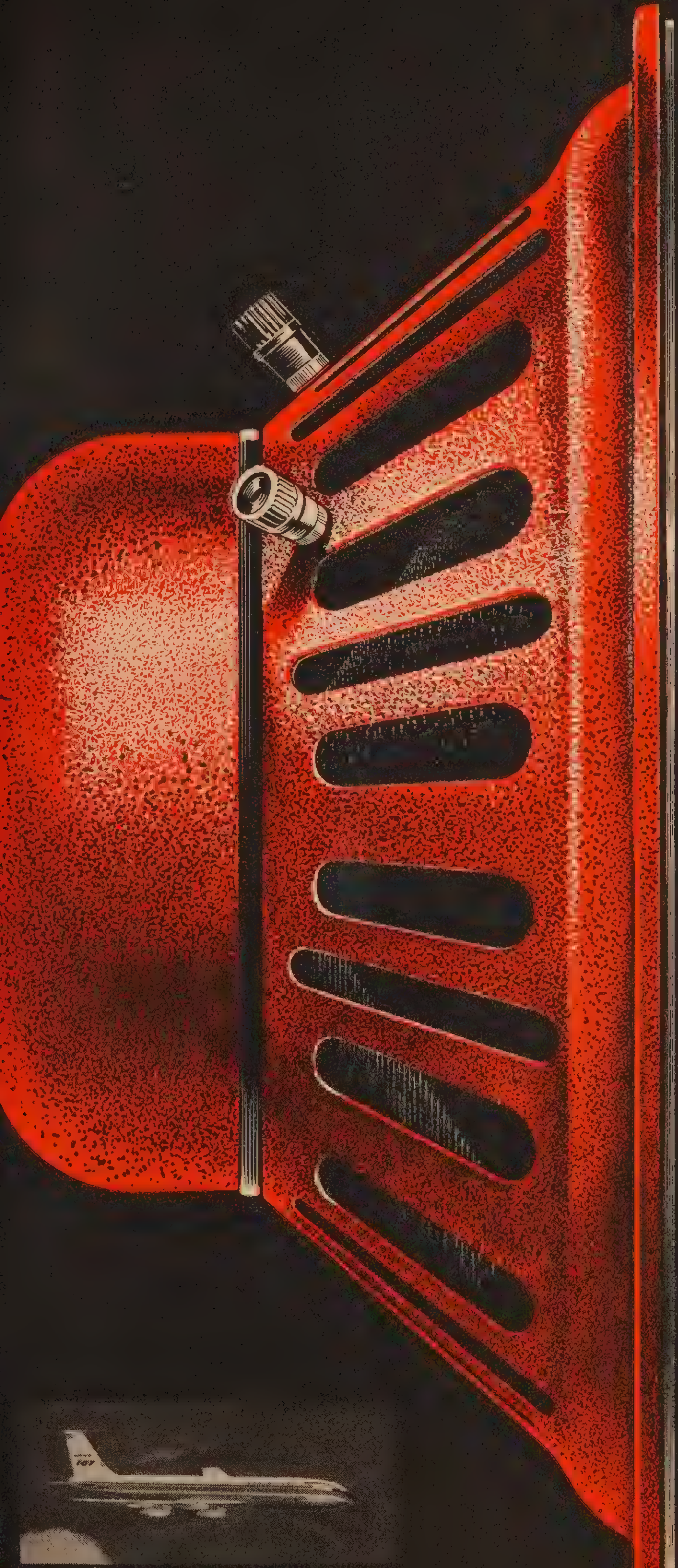
SENCORE has opened a new advertising and promotional campaign, making the company the largest advertiser of test equipment in the serviceman's field.

UNITED MOTORS SERVICE DIV. reports the following two promotions: S. W. ARCHER, Operations Dir., and G. SCOTT FOSTER, Asst. Gen. Sales Mgr.-Marketing.

RAYTHEON CO. announced the following two appointments: RICHARD E. KRAFVE, Executive Vice Pres.; and HOMER R. OLDFIELD, group Vice Pres.-electronic components and devices, a newly created post.

RADIO CORP. named FRED M. FARWELL to the newly created corporate staff position of Vice Pres., Marketing. RCA distributors will be offered 12 premiums in a new sales promotion program for RCA entertainment receiving tubes called "Operation Spectacular."

GENERAL ELECTRIC announces the following in connection with expansion and realignment of sales facilities serving distributors in New England: JOHN WORSCHAK appointed an additional District Sales Mgr. covering a newly-established district including Me., N.H., Vt., and the marketing areas of Providence, R.I., Fall River, New Bedford and Worcester, Mass.; CLAYTON RYDER will now cover the Boston area; and VICTOR S. SYZDEK, western Mass. and Conn.



*These new Utah speakers were inspired by the fabulous new Boeing 707 Jet Airliner, now streaking coast to coast in just 4½ hours! Utah speakers, *too*, pack more power per pound, feature Jet Airliner slim-line design to meet modern demands for more compact Stereo and High Fidelity applications.

MORE POWER PER POUND

in the ALL-NEW UTAH*

dual-diameter speakers

. . . Never before such *concentrated power!* The secret is in Utah's brand new dual-diameter magnetic circuitry and dynamic Uni-coils. By ingeniously combining two magnetic material structures into one, Utah has produced the greatest power per pound in a loud-speaker since the advent of Alnico V. See the all new Utah speakers now — 8″ full range model **D8LA** and 12″ full range model **D12LA** — they're as "hot" as a Jet Airliner!

utah

SPEAKERS

Utah Radio & Electronic Corp., Huntington, Ind.

Mullard TUBES CIRCUITS

engineered for high fidelity
stereo
am / fm
television

MULLARD electron tubes, universally recognized for their advanced designs and reliability, offer a *selected range** of tubes for High Fidelity, AM/FM, Television, and Industrial Applications.

This *selected range**, which uses *frame grids, special glass, coiled heaters, bifilar windings, special mica construction, low hum and microphony, rugged construction, longer life* are features found in more expensive premium tubes.
At MULLARD these extras are standard in the regular commercial production — AT NO EXTRA COST.

Discover the advantages of MULLARD tubes in your equipment — now!

Detailed data and application engineering assistance available upon request.

Mullard
Trade Mark
Mullard Ltd.

"Circuits for Audio Amplifiers" is a new MULLARD publication in which the wide range of MULLARD high quality audio circuits is presented conveniently in one book. Four introductory chapters are devoted to theoretical and practical considerations of high quality sound reproduction with monophonic equipment or with stereophonic systems. The rest of the book comprises circuit descriptions, constructional details, and some performance figures of 12 MULLARD circuits. These circuits include well-known MULLARD designs, some modifications and improvements to these circuits, and a number of completely new ones. Only $2.50 from your dealer or by mail from our Technical Services Division.

INTERNATIONAL ELECTRONICS CORP.
81 SPRING ST., NEW YORK 12, N.Y.

(Continued from page 18)

MOTOROLA Semiconductor Products Div. has named ALLEN SNYDER Advertising & Sales Promotion Mgr.

HYCON MFG. CO. has elected JAMES S. LAIDLAW, Vice Pres. and Gen. Mgr., and EDMUND W. BAKER, Vice Pres.-Engineering and Chief Engineer.

LING-ALTEC plans a $600,000 expansion of their plant in Anaheim, Calif., including one new manufacturing building which will provide approximately 65,000 additional sq.ft. of plant area.

PYRAMID ELECTRIC CO. has launched a new "Baker's Dozen" promotion whereby type S1-500 silicon rectifiers are offered on a multi-colored display card containing 13 packaged rectifiers.

ADMIRAL CORP. has promoted CLARENCE B. FLINN to the newly created position of Asst. Product Mgr., Electronics Div. JOHN L. MC DONALD, Dallas, was appointed Regional Sales Mgr. covering Admiral distributors in that area.

HOFFMAN ELECTRONIC Semiconductor Div. has appointed two men to new positions in its Sales Dept.: ALBERT H. BINASH, Distributor Sales Mgr., and BENTON W. ROBERTS, Sales Engineer for the new West Central territory of Kans., Mo., Neb., Ia. and S. Ill.

BENDIX AVIATION CORP. has begun construction of a new 72,000 sq.ft. semiconductor products plant in Holmdel, N.J. BENDIX RADIO DIV. reports that sales of railroad and mobile two-way radio equipment for the first eight months of 1959 more than doubled the figure for the same period in 1958.

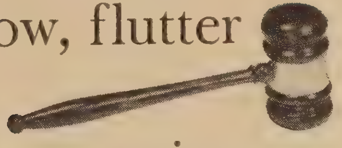
HICKOK ELECTRICAL INSTRUMENT CO. is sponsoring a series of transistor service clinics at key distributors throughout the country. The clinics will be informal, all-day sessions. Since there will be no formal program, servicemen can attend at their convenience and will have the opportunity for personal discussion of particular servicing problems. Clinic dates will be announced by distributor mailings.

INTERNATIONAL RESISTANCE CO. has announced the appointment of WALTER WARE SLOCUM as Pres. CHARLES WEYL became Chmn. of the Bd. CHICAGO TELEPHONE SUPPLY CORP. and IRC reached a marketing agreement whereby IRC becomes sales rep for CTS industrial and military variable resistor products in five major marketing areas.

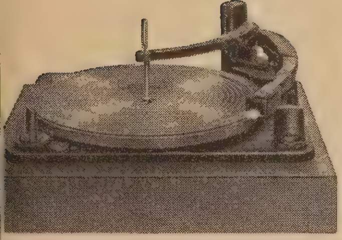
Verdict:

Collaro

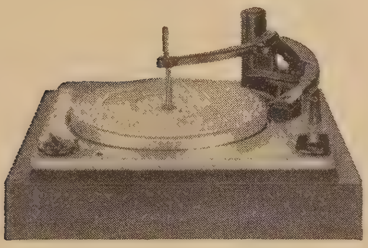
stereo
record players
are innocent
of rumble,
wow, flutter



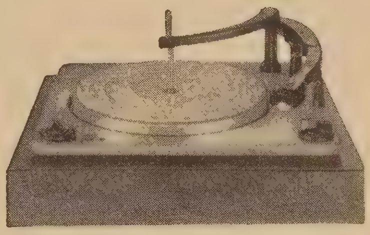
or any noises
that
interfere
with enjoyment
of music



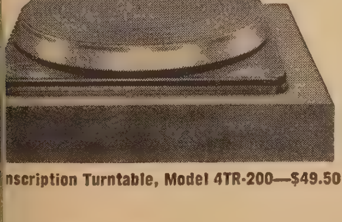
The Constellation, Model TC-99—$59.50



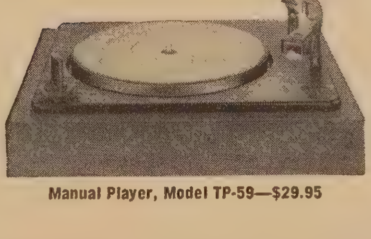
The Continental II, Model TSC-840—$49.50



The Coronation II, Model TSC-740—$42.50
***The Conquest II, Model TSC-640—$38.50**



nscription Turntable, Model 4TR-200—$49.50



Manual Player, Model TP-59—$29.95

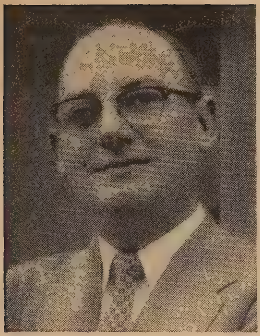
ROCKBAR
Corporation

ry Collaro stereo record player is built with typical British attention to every detail. They are precision engineered and rigidly tested to give truly profes-
nal performance and the ultimate in operating convenience. Here are some of the more important features that make Collaro the logical choice for stereo or
nophonic records. • Performance specifications exceed NARTB standards for wow, flutter and rumble — with actual performance test reports accom-
ıying each model TC-99. • Extra-heavy, die-cast, non-magnetic turntables (weighing up to 8½ lbs.). Extra-heavy weight is carefully distributed for flywheel
ect and smooth, constant rotation. • Shielded four-pole motors are precision balanced, screened with triple interleaved shields to provide extra 25 db reduction
nagnetic hum pick-up. • Detachable five-terminal plug-in head shells (on TC-99, TSC-840, TSC-740, TP-59) provide two completely independent circuits, guaran-
ing ultimate in noise reduction circuitry. • Transcription-type stereo tonearms are spring-damped and dynamically counterbalanced to permit the last record
a stack to be played with virtually the same low stylus pressure as the first. • All units are handsomely styled, available with optional walnut, blond and
nogany finished bases or unfinished utility base. There's a 4-speed Collaro stereo record player for every need and budget! Prices slightly higher in the
st. For free catalog on the Collaro line, write to: **Rockbar Corporation, Dept. ET-11 Mamaroneck, N. Y.** (*Not shown. Similar in appearance to The Coronation.)

RC-18

"It's good business to use this 90-day Repair Bond," says Ken Rodrigue. "We find it helps the customer feel, more than ever, that he has received full value from his service dollar."

"Most Constructive Step in the Industry"



"The new Raytheon Bonded Dealer Program is the best step yet towards identifying competent and reliable service organizations.

"It really goes a long way in assuring the public that its investment in qualified service is the best means –maybe the *only* means– of enjoying trouble-free radio and TV.

"And this assurance is actually put right in their hands with the Raytheon 90-day Repair Bond.

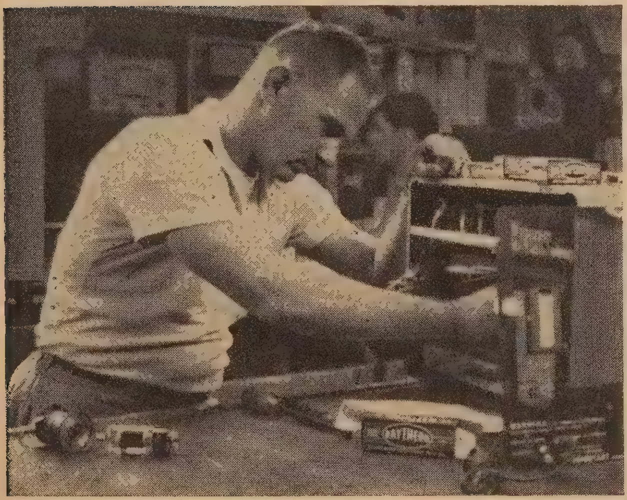
"In addition, Raytheon backs the Bonded Dealer Program with national consumer advertising. And the Raytheon distributors supply local direct mail and advertising support. The average dealer couldn't afford this. Speaking for ourselves, we've tied into these programs with great success.

"Of course, we know that advertising promises have no value without quality products to back them up. Nine years of Raytheon tubes and CRT's have proved to us that a dealer can count on the Raytheon brand name.

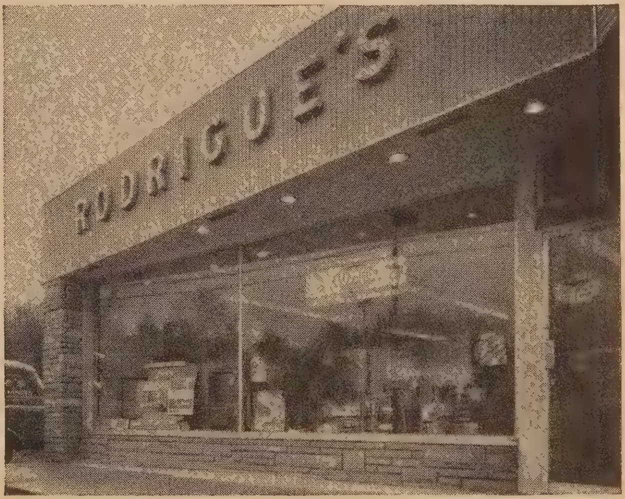
"Congratulations on the whole Bonded Dealer Program–we know that it's helping us to increase profits."

K. J. Rodrigue, President
Rodrigue's Radio & Television, Inc.
Milford, Conn.

Cash in! If you haven't signed up as a Raytheon Bonded Dealer, call your Raytheon Distributor today to march with the profit parade.



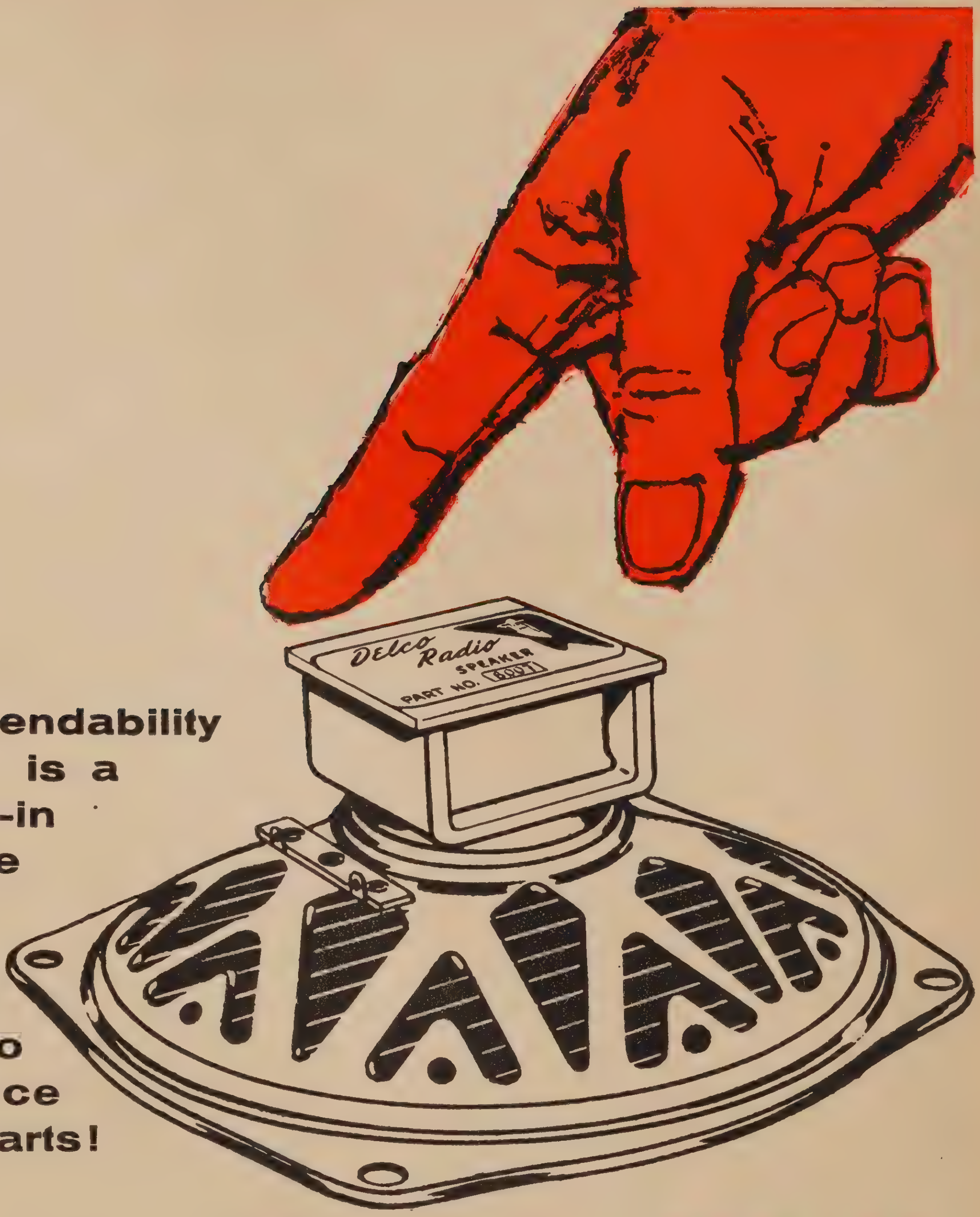
"We average over 6000 service jobs a year," says Ken. "To achieve this kind of volume we depend on the skill and efficiency of our service technicians and top-quality Raytheon Tubes."



"As Milford's largest servicing organization we have counted on Raytheon quality since the day we opened," relates Ken. "In addition I like the 24 hour service I get from my Raytheon distributor."

RAYTHEON COMPANY • DISTRIBUTOR PRODUCTS DIVISION

RAYTHEON



Dependability is a built-in feature of all Delco Radio Service Parts!

Take speakers, for instance. Delco electronic speakers are built rugged for long life and resistance to extreme weather conditions. You can rely on them for exceptional power handling and rich distortion-free tone.

Delco's popular 8-inch "Hi-Fi" speaker, No. 8007, provides the most power and tonal range for the money. Designed for replacement use and high fidelity audio systems, it's a good, fast seller with price and quality appeal.

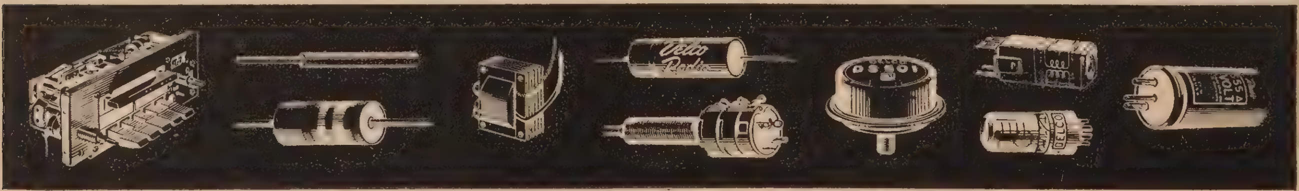
For speakers, transistors, transformers and other fine parts for Delco and other radios, see your Delco Electronic Parts Distributor. He carries the complete line. Other extras you get with Delco are • Wide selection of special application parts • Complete technical training program • Effective warranties • Dealer identification signs.

Stock with Delco Electronic Parts—more dependability and reliability for your customers, more profit for you.

DELCO RADIO
DEPENDABILITY
RELIABILITY

Division of General Motors • Kokomo, Indiana

Available everywhere through
Electronic Distributors
associated with
GM U·M·S PARTS SALES
UNITED MOTORS SYSTEM



Reps & Distributors

RAY R. HUTMACHER ASSOC. has been joined by WILLIAM MENEZES in the firm's Ill. and Wis. territory.

ENTRON reports the appointment of NELSON E. THOMAS & ASSOC. as Southern manufacturer's rep.

EITEL-MC CULLOUGH INC. appointed FRED F. BARTLETT & CO. field reps in the mid-Atlantic area for their electron-power tubes.

R. EDWARD STEMM organization has been joined by JAMES O. SCHOCK as a Sales Engineering Agent covering the S. half of Ind., Ill. and St. Louis, Mo. and Louisville, Ky.

INTERNATIONAL RECTIFIER CORP. Distributor Sales Division named S. R. ROSS, INC. authorized industrial distributor in the Salt Lake City area.

ERIE RESISTOR CORP. Electronic Distributor Div. has named KIMBALL DISTRIBUTING CO. and ALMO RADIO CO. distributors of Corning glass electronic components.

TELETRONICS LAB. appoints three new reps to handle test equipment products: JOHN B. LIGHTSTONE, upper N.Y. state; ELECTRO-MEC ASSOC., Michigan; and J. K. DOOLEY CO., Wash. and Ore.

ALLEN B. DU MONT LABS. names the following two distributors of industrial CRT's: H. L. DALIS, INC., N.Y.C. metropolitan area; and FEDERATED PURCHASER CORP., Newark, Essex and Union Co. market area.

ELECTRONIC REPRESENTATIVES ASSOC. will present a new industry award for excellence in sales management to four outstanding sales managers at the ERA Convention in January. Nominations by ERA members of sales managers in each of the audio, distributor, industrial components and instrument field will be judged by an impartial group.

PYRAMID
UNION CITY, N.J.

BURTON BROWNE/New York

PYRAMID
CAPACITY-RES LEAKAGE
POWER FACTOR
UNION CITY, N.J.

For Checking Miniaturized Equipment, Pyramid's Model RC-1 New Resistance-Capacity-Ratio Bridge Tester. Budget priced . . . outstanding quality instrument . . . the RC-1 saves you both time and money. Precision-engineered, Pyramid's new model RC-1, Resistance-Capacity-Ratio Bridge Tester has a special low voltage bridge and stable vacuum tube amplifier for safe testing low voltage electrolytics such as commonly used in transistorized receivers.

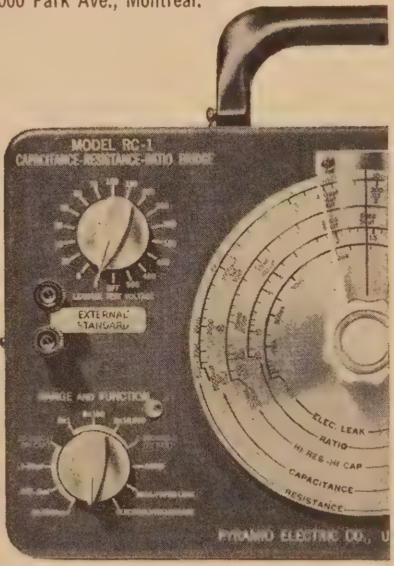
Pyramid's RC-1, Resistance-Capacity-Ratio Bridge Tester is a functionally designed, sturdy, compact, lightweight unit, ideal for use by technicians, servicemen and engineers in radio, television (color as well as black and white), industrial electronics and all related fields.

PYRAMID MODEL RC-1 FEATURES:

- Special 3 volt amplifier for checking low voltage electrolytics used in miniaturized equipment such as transistor radios, etc.
- Capacity Ranges—from 10 mmfd. to 2000 mfd.
- Resistance—from .5 ohms to 200 megohms in 4 ranges.
- Ratio Test—provides quick reactance or resistance ratio between any two capacitors, inductors or resistors—range: .05 to 1 and 20 to 1. It can be used also to determine turns ratio of transformer windings within this range.
- Leakage Tests—handles all types of capacitors at rated voltages between 0 and 500V DC.
- Power Factor—0 to 60% (on capacitors from .1 mfd to 2000 mfd).
- Capacitor Test Voltages—variable between 0 and 500V DC in 17 steps.

PRICE: Dealer Net—$44.95

For further information about the RC-1 see your Pyramid distributor or write for complete technical data to: Pyramid Electric Company, Union City, N. J. EXPORT: 458 Broadway, N. Y. 13, N. Y. • CANADA: Wm. Cohen, Ltd.—7000 Park Ave., Montreal.



PYRAMID
ELECTRIC CO.

DAVE GARROWAY
"Today"
NBC-TV
JOHN PAYNE
"Restless Gun"
ABC-TV
GALE STORM
"The Gale Storm Show"
ABC-TV
BOB CUMMINGS
"Love That Bob"
ABC-TV

"4 STARS" for the CHANNEL MASTER® T-W

"4 STARS" — recognized symbol for superb performance.

"4 STARS" — going all-out to help you sell more antennas.

Who doesn't recognize these top-rated TV stars? Their audience numbers millions. And hard-hitting commercials are telling these millions ... over and over again ... to replace their old, worn-out antennas with the powerful Channel Master T-W.

On network TV ... in the top farm publications ... in best-selling mass magazines ... Channel Master is using the power of *all-out National Advertising* to help you do a bigger, MORE PROFITABLE, antenna installation business.

That's why it makes good sense for you to promote and install the Channel Master T-W ... the one antenna that has never been equalled for brilliant performance and rugged construction.

FULL NETWORK TV

FOUR TOP SHOWS

2 MAJOR TV NETWORKS

210 TV STATIONS

3 TOP FARM PUBLICATIONS

The Progressive Farmer

Successful Farming

Farm Journal

2 BEST-SELLING GENERAL MAGAZINES

The Saturday Evening Post

Coronet

NEW DISPLAY POSTERS

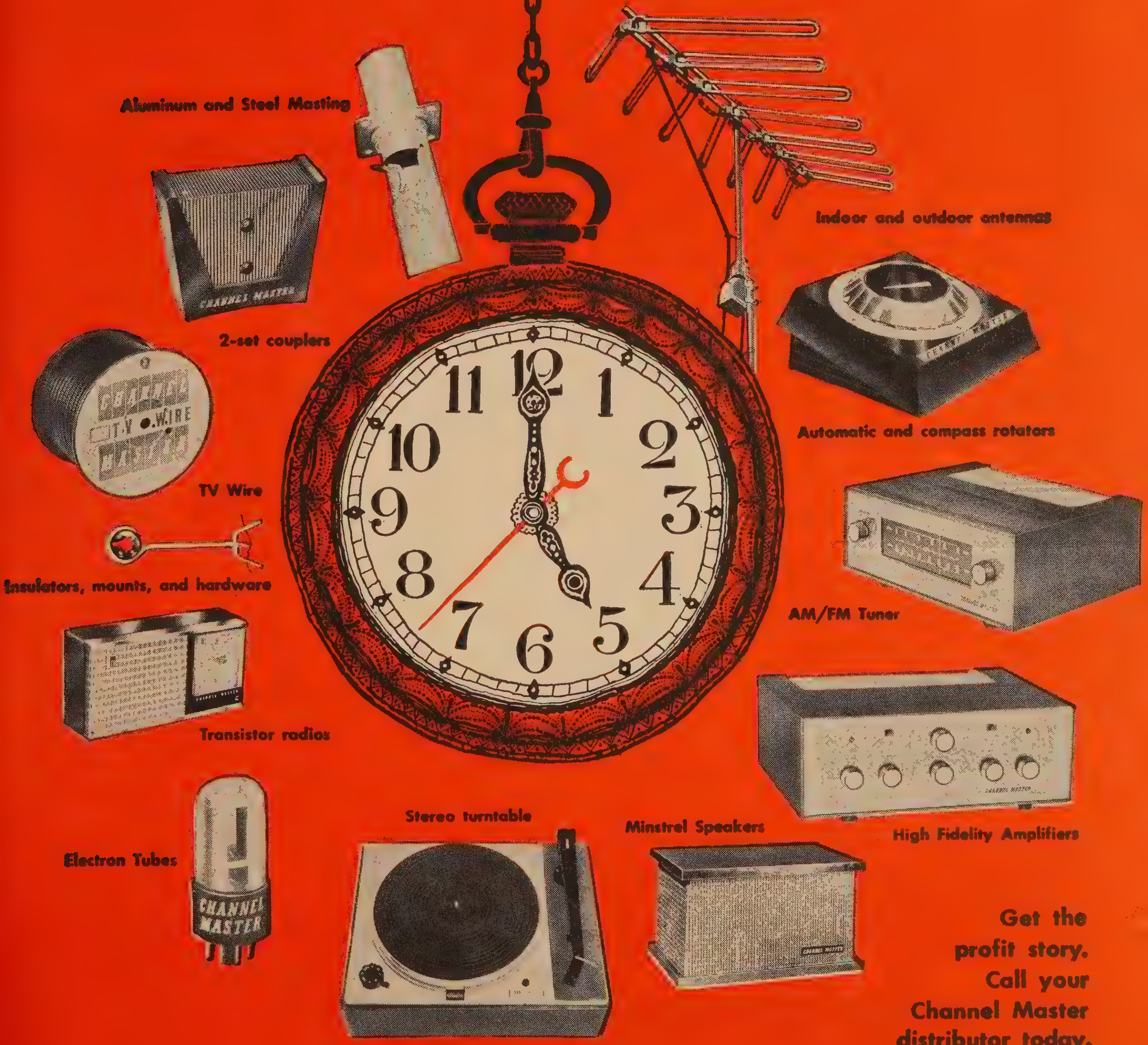
SEE THE STARS AT THEIR BRIGHTEST WITH THE
CHANNEL MASTER T-W
ALL-CHANNEL TV ANTENNA

Available from your Channel Master distributor.

CHANNEL MASTER works wonders in Sight and Sound

CHANNEL MASTER advertising works 'Round the Clock

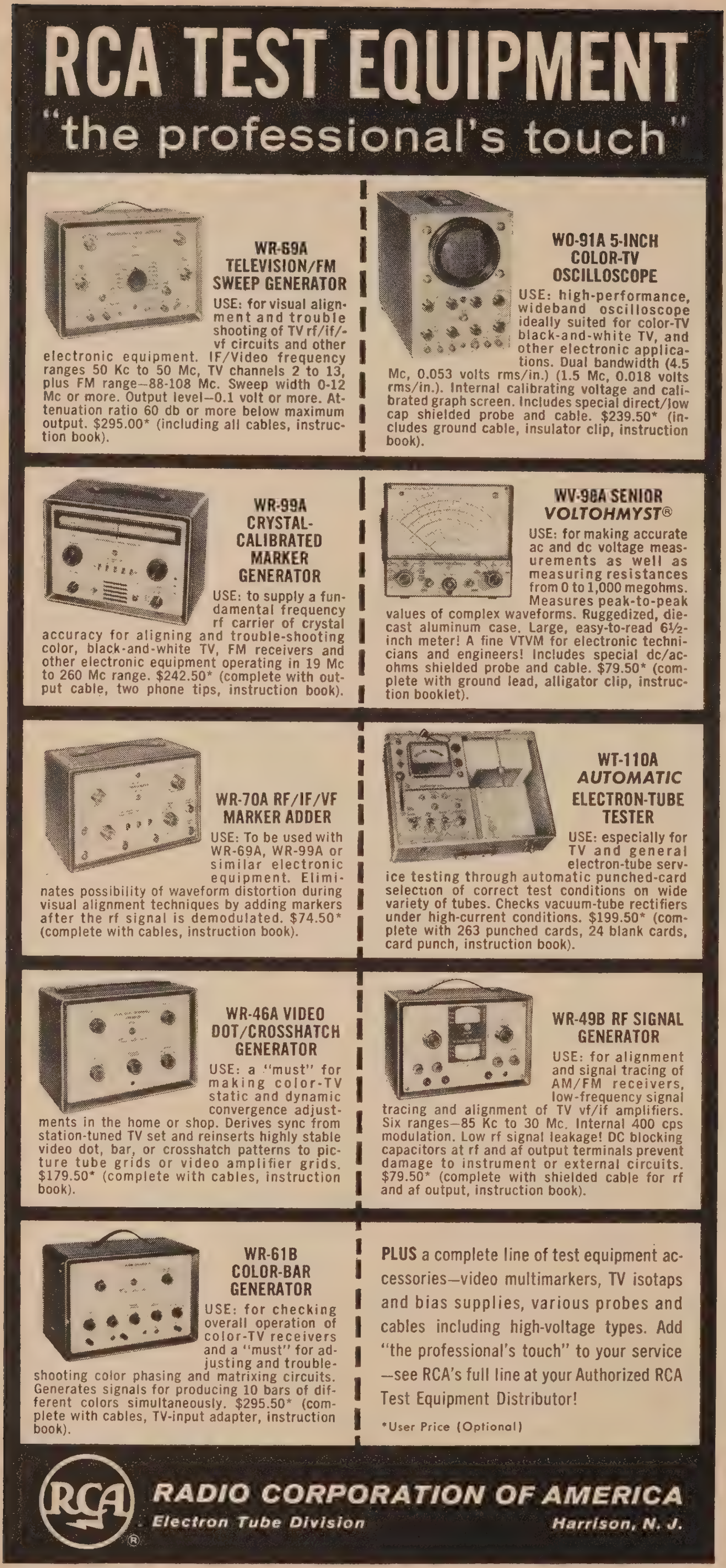
...to make friends
and customers
for the full line of
Channel Master products.


Aluminum and Steel Masting
Indoor and outdoor antennas
2-set couplers
CHANNEL MASTER
TV Wire
CHANNEL MASTER T.V. WIRE
Automatic and compass rotators
Insulators, mounts, and hardware
AM/FM Tuner
Transistor radios
High Fidelity Amplifiers
Electron Tubes
CHANNEL MASTER
Stereo turntable
Minstrel Speakers

Get the
profit story.
Call your
Channel Master
distributor today.

CHANNEL MASTER CORP. ELLENVILLE, N. Y.

Copyright 1959 Channel Master Corp.



RCA TEST EQUIPMENT

"the professional's touch"

WR-69A TELEVISION/FM SWEEP GENERATOR
USE: for visual alignment and trouble shooting of TV rf/if/vf circuits and other electronic equipment. IF/Video frequency ranges 50 Kc to 50 Mc, TV channels 2 to 13, plus FM range—88-108 Mc. Sweep width 0-12 Mc or more. Output level—0.1 volt or more. Attenuation ratio 60 db or more below maximum output. $295.00* (including all cables, instruction book).

WO-91A 5-INCH COLOR-TV OSCILLOSCOPE
USE: high-performance, wideband oscilloscope ideally suited for color-TV black-and-white TV, and other electronic applications. Dual bandwidth (4.5 Mc, 0.053 volts rms/in.) (1.5 Mc, 0.018 volts rms/in.). Internal calibrating voltage and calibrated graph screen. Includes special direct/low cap shielded probe and cable. $239.50* (includes ground cable, insulator clip, instruction book).

WR-99A CRYSTAL-CALIBRATED MARKER GENERATOR
USE: to supply a fundamental frequency rf carrier of crystal accuracy for aligning and trouble-shooting color, black-and-white TV, FM receivers and other electronic equipment operating in 19 Mc to 260 Mc range. $242.50* (complete with output cable, two phone tips, instruction book).

WV-98A SENIOR *VOLTOHMYST®*
USE: for making accurate ac and dc voltage measurements as well as measuring resistances from 0 to 1,000 megohms. Measures peak-to-peak values of complex waveforms. Ruggedized, die-cast aluminum case. Large, easy-to-read 6½-inch meter! A fine VTVM for electronic technicians and engineers! Includes special dc/ac-ohms shielded probe and cable. $79.50* (complete with ground lead, alligator clip, instruction booklet).

WR-70A RF/IF/VF MARKER ADDER
USE: To be used with WR-69A, WR-99A or similar electronic equipment. Eliminates possibility of waveform distortion during visual alignment techniques by adding markers after the rf signal is demodulated. $74.50* (complete with cables, instruction book).

WT-110A *AUTOMATIC* ELECTRON-TUBE TESTER
USE: especially for TV and general electron-tube service testing through automatic punched-card selection of correct test conditions on wide variety of tubes. Checks vacuum-tube rectifiers under high-current conditions. $199.50* (complete with 263 punched cards, 24 blank cards, card punch, instruction book).

WR-46A VIDEO DOT/CROSSHATCH GENERATOR
USE: a "must" for making color-TV static and dynamic convergence adjustments in the home or shop. Derives sync from station-tuned TV set and reinserts highly stable video dot, bar, or crosshatch patterns to picture tube grids or video amplifier grids. $179.50* (complete with cables, instruction book).

WR-49B RF SIGNAL GENERATOR
USE: for alignment and signal tracing of AM/FM receivers, low-frequency signal tracing and alignment of TV vf/if amplifiers. Six ranges—85 Kc to 30 Mc. Internal 400 cps modulation. Low rf signal leakage! DC blocking capacitors at rf and af output terminals prevent damage to instrument or external circuits. $79.50* (complete with shielded cable for rf and af output, instruction book).

WR-61B COLOR-BAR GENERATOR
USE: for checking overall operation of color-TV receivers and a "must" for adjusting and trouble-shooting color phasing and matrixing circuits. Generates signals for producing 10 bars of different colors simultaneously. $295.50* (complete with cables, TV-input adapter, instruction book).

PLUS a complete line of test equipment accessories—video multimarkers, TV isotaps and bias supplies, various probes and cables including high-voltage types. Add "the professional's touch" to your service—see RCA's full line at your Authorized RCA Test Equipment Distributor!

*User Price (Optional)

RCA® RADIO CORPORATION OF AMERICA
Electron Tube Division — Harrison, N. J.

Catalogs & Bulletins

SEMICONDUCTORS: Over 2,100 types of transistors, diodes and rectifiers, produced by 16 leading domestic manufacturers, are listed in the fifth edition of the firm's semiconductor directory. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill. (ELECTRONIC TECHNICIAN B11-1)

PHONO CARTRIDGES: An 8-page catalog, PF-285, provides a cross-reference chart for exact replacement of more than six million phono cartridges. Both CBS-Ronette and Columbia CD cartridges are listed. Technical specifications are included. CBS Electronics, Danvers, Mass. (ELECTRONIC TECHNICIAN B11-2)

INDICATOR LIGHTS: A new 4-page, 2-color, brochure, Form L-162, covers 4 series of subminiature indicator light assemblies designed to mount in a $\frac{15}{32}$" clearance hole from the front of the panel. Dialight Corp., 60 Stewart Ave., Brooklyn 37, N. Y. (ELECTRONIC TECHNICIAN B11-3)

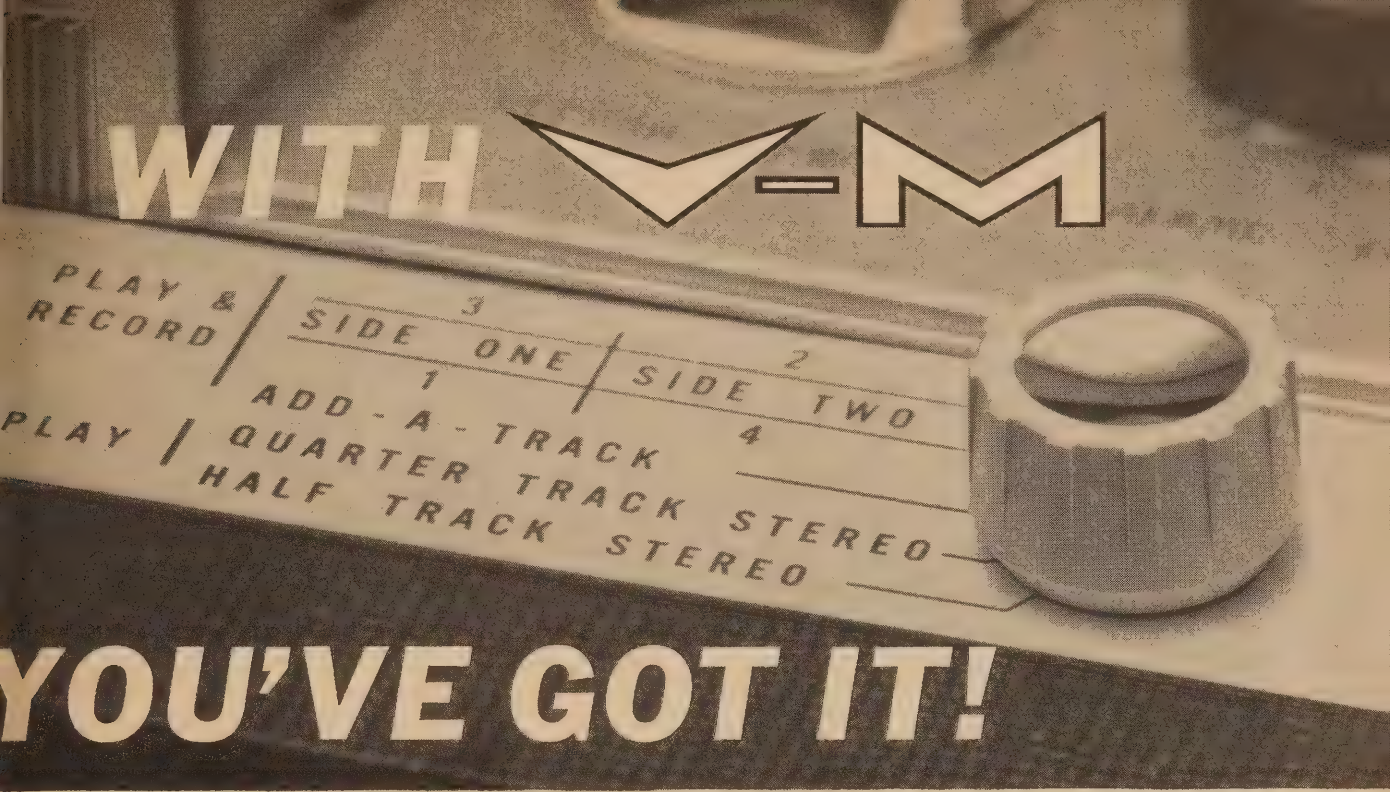
ELECTRICAL WIRING DEVICES: Over 1,500 electrical wiring devices are shown in a new 60-page catalog. All products are grouped in categories and cross-indexed. Eagle Electric Mfg. Co., 23-10 Bridge Plaza South, Long Island City 1, N. Y. (ELECTRONIC TECHNICIAN B11-4)

ELECTRONIC KITS: Announced is a new 66-page 1960 catalog of electronic equipment in kit form. Included, with many new items, are high fidelity components, test instruments and marine equipment. Heath Company, Benton Harbor, Mich. (ELECTRONIC TECHNICIAN B11-5)

ELECTRONIC COMPONENTS: Bulletins available, covering a new series of precision electronic components, are: #217—Differential variable trimmer capacitors; #218—Miniature glass differential sealcap trimmers; #219—Miniature split stator trimmers; #220—Miniature split stator sealcap trimmers and #221—MAX-C trimmer. JFD Electronics Corp., 1462 62nd St., Brooklyn, N. Y. (ELECTRONIC TECHNICIAN B11-6)

POWER SUPPLY: Bulletin #15-7 features application, circuitry and specifications of a new high-precision instrument: Model 301 d-c voltage standard and null meter. Kin Tel Div., Cohu Electronics, 5725 Kearny Villa Rd., San Diego 12, Calif. (ELECTRONIC TECHNICIAN B11-7)

(*Continued on page 30*)



)NLY and ONLY V-M has "ADD-A-TRACK" the MOST Practical, he MOST Useable, the MOST Unusual Feature ANY Top Tape Recorder has to Offer!

VHAT IS "ADD-A-TRACK"? "Add-A-Track" is an xclusive V-M feature that allows the user of a V-M 'tape-o-natic'® Model 720 to record vocal or instrumental music or voice lone. Any tape recorder can do that, you say? *Wait just one ninute!* After the user does this, he simply rewinds the tape and, vhile listening to the first recording, records the musical accompaniment or "second" voice on another track of the tape, which n the playback will be heard as a simultaneous recording.

IOW DOES IT WORK? Suppose you play the piano nd would like to hear how you would sound playing a duet vith yourself? *Here's how:* With V-M's Model 720, you simply et up for regular recording, play the number, rewind, turn the ELECTOR knob to ADD-A-TRACK and then record your ccompaniment. In the playback, the first recording is heard hrough an accessory amplifier-speaker (as V-M Model 166) vhile the second recording is being heard from the tape recorder self. Pre-recorded "Add-The-Melody" tapes are also available n the market.

IMAGINE the unlimited applications of this exclusive feature to teaching and learning ... in Education ... in Business ... in Industry, in addition to its appeal for pure "home entertainment"!

V-M Model 720 is a NEW FOUR-TRACK TAPE RECORDER with the "TOP TWELVE" SELLING FEATURES

- Plays All Stereophonic Tapes (2-track, 4-track, either stacked or staggered)
- Records and Plays-Back Monophonically
- Cathoptic Tuning Eye for Professional-Quality Recording Results
- A High Quality, High Fidelity Microphone (included)
- Blue-Gray Leatherette Case—Completely Portable —Only $225.00† list
- Model 166 Auxiliary Amplifier-Speaker—$75.00† list

†Slightly higher in the West

AND...V-M Puts You in the Tape Recorder Business...

No costly inventory investment ... a complete "sales activity" package includes display fixtures, point-of-sale, promotions ... *EVERYTHING!* V-M's giant *"Family Pleasure Package"*—an irresistible consumer buying incentive. It's a complete V-M created kit of entertaining and educational "things-to-do" with a tape recorder for the whole family. BIG "How-To-Do-It" Manual included.

You'll immediately spark real interest and create profitable sales with this colorful counter-high *V-M Tape Recorder Sales Center.* Versatile, utilitarian, hard-hitting display fixture has space for a V-M tape recorder, plus extra profits in display of V-M tape editing kit and accessory mike stand. It effectively displays V-M "Family Pleasure Package."

Stay on the "Right Track" with "ADD-A-TRACK"... ONLY from V-M!

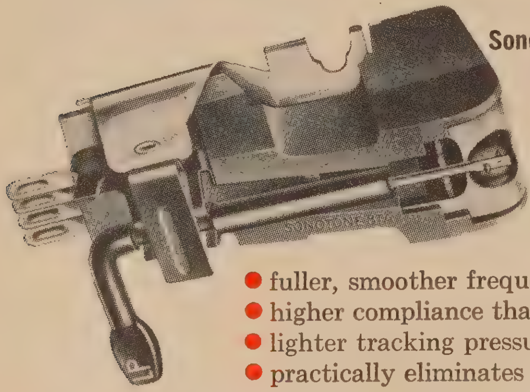
your choice for music is
the Voice of Music®

/-M CORPORATION • BENTON HARBOR, MICHIGAN • WORLD FAMOUS FOR THE FINEST IN RECORD CHANGERS, PHONOGRAPHS AND TAPE RECORDERS

Now . . . from Sonotone—

4 Big Improvements

in the quality stereo cartridge



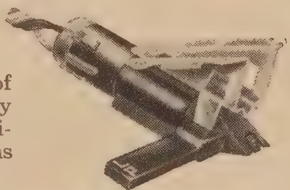
Sonotone 8TA cartridge replaces 8T as industry standard

The new Sonotone 8TA cartridge gives greater than ever stereo performance . . . has 4 big extras:

- fuller, smoother frequency response
- higher compliance than ever before
- lighter tracking pressure
- practically eliminates dust pile-up

ONLY $14.50*

Sonotone 10T unitized stereo at lowest price ever



New 10T cartridge sells at record low price of $6.45.* And it covers the complete high fidelity range. 10T's unitized construction makes it easiest to install, easiest to replace. Low price means more sales—more profits.

SPECIFICATIONS

	8TA	10T
Frequency Response	Smooth 20 to 20,000 cycles. Flat to 15,000 with gradual rolloff beyond.	Flat from 20 to 15,000 cycles ± 2.5 db.
Channel Isolation	25 decibels	18 decibels
Compliance	3.0 x 10⁻⁶ cm/dyne	1.5 x 10⁻⁶ cm/dyne
Tracking Pressure	3-5 grams in professional arms 4-6 grams in changers	5-7 grams
Output Voltage	0.3 volt	0.5 volt
Cartridge Weight	7.5 grams	2.8 grams
Recommended Load	1-5 megohms	1-5 megohms
Stylus	Dual jewel tips, sapphire or diamond.	Dual jewel tips, sapphire or diamond.

*including mounting brackets

Sonotone makes only 6 basic ceramic cartridge models . . . yet has sold over 9 million units . . . used in over 662 different phonograph models. For finest performance, replace worn needles with genuine Sonotone needles.

Sonotone® CORP.
Electronic Applications Division, Dept. CT-119
ELMSFORD, NEW YORK

Leading makers of fine ceramic cartridges, speakers, tape heads, microphones, electronic tubes.
In Canada, contact Atlas Radio Corp., Ltd., Toronto

(Continued from page 28)

SEMICONDUCTORS: Announced is a new semiconductor directory of germanium and silicon transistors, diodes and rectifiers. Major manufacturers and types are numerically listed with descriptions and applications. Lafayette Radio, 165-08 Liberty Ave., Jamaica 33, N. Y. (ELECTRONIC TECHNICIAN B11-8)

COMPONENTS: Bulletin #59-4 is a 4-page, 2-color, catalog describing and giving specifications for sockets, plate caps, grid grips, terminal components and assemblies for radio and electronic applications. National Radio Co., 37 Washington St., Melrose 76, Mass. (ELECTRONIC TECHNICIAN B11-9)

CONNECTORS: A colorful, 4-page, brochure provides a listing by insert arrangement and number of Cannon ms E/R connectors, meeting MIL-C-5015C and MIL-C-5015D. Schweber Electronics, 60 Herricks Rd., Mineola, L. I., N. Y. (ELECTRONIC TECHNICIAN B11-10)

TEST INSTRUMENTS: The following additions to the firm's line are covered in a one-page brochure; transistorized voltmeter; transistorized signal generator; vibration meter; vacuum-tube voltmeter; audio response plotter; amplifier and microsource. Southwestern Industrial Electronics Co., 10201 Westheimer Rd., Houston 27, Texas. (ELECTRONIC TECHNICIAN B11-11)

CAPACITORS: Two 4-page illustrated Product Engineering Bulletins, Nos. A-110 and A-115, cover subminiature glass-to-metal sealed tubular capacitors types AQF and TQF respectively. The Bulletins contain a complete list of military and commercial ratings, performance characteristics and test specifications. Astron Corp., 255 Grant Ave., East Newark, N. J. (ELECTRONIC TECHNICIAN B11-12)

TV REPAIR
RUM

"It's OK now. We had put on each other's glasses by mistake."

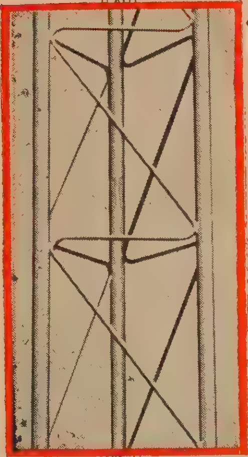
LOOK TO ROHN

for ALL TV installation needs!

LOOK TO THE FOREMOST NAME IN THE COMPLETE LINE OF HOME TV, AMATEUR AND COMMUNICATION TOWERS, PLUS A COMPLETE LINE OF INSTALLATION NEEDS.

You'll find that the ROHN line is *complete*. It gives you *better* products at a *better* price. Practically all ROHN products are available in the finest of finishes . . . *hot-dipped galvanizing!* Rely on the *dependable* name for ALL your needs—ROHN . . . today one of the largest manufacturers of a *complete* line of this type equipment.

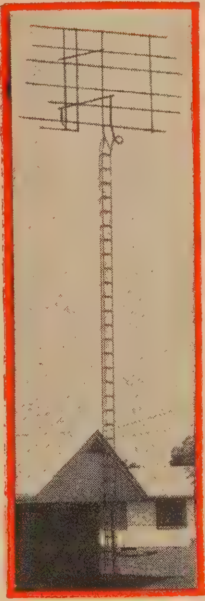
TOWERS

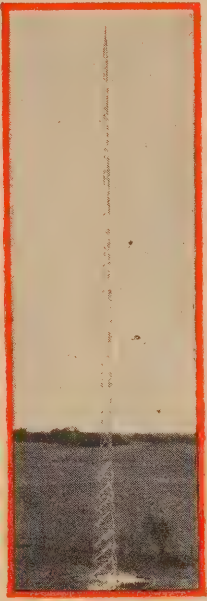


No. 25 The ROHN No. 25 tower is one of the finest ever designed . . . a full 33% stronger and more durable than "similar sized" towers. This is achieved by amazing zig-zag cross bracing design combined with highest grade steel and heavy-duty steel side-rail tubing. This superior strength means that this tower can ordinarily be installed self-supporting to 50 feet or guyed to 200! It is truly the *finest* tower of its kind for home television reception.

No. 6

This ROHN tower features the well-known "magic triangle", the cross-bracing construction that is unequalled in strength and durability. Also available self-supporting, or guyed to about 150 feet.





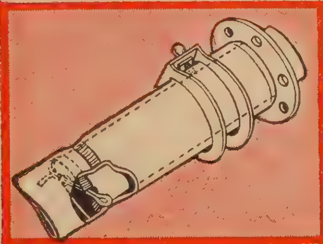
Fold-over The No. 25, as well as heavy-duty No. 40 communication tower, can be converted into "fold-over" towers for amateur use . . . the *only* tower of its kind. They let you work "on the ground!"

Communications

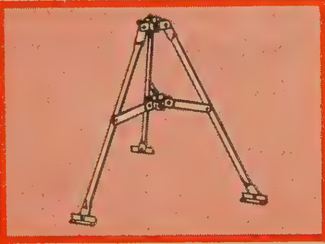
FIVE complete lines of communication towers are available to fulfill *practically* any need, including a 130 foot true heavy-duty communication tower that is completely self-supporting and guyed models up to 600 feet!

Complete communications catalog sent on request!

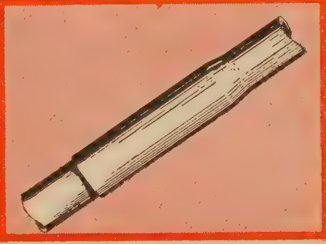
PLUS ALL THESE ROHN DESIGNED ITEMS



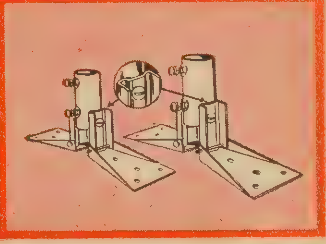
Telescoping masts—Unexcelled in design, structure and strength, with several exclusive features! All popular sizes, heights and weights available.



Roof towers—Available in 10, 5 and 3 foot heights. Most of them are collapsible for easy shipping. Ideal in use—a ROHN "big-seller".



Tubing—Just what you want: 6" expanded end with ½" taper to form a solid locking joint! High carbon steel. Available 5, 10 foot lengths, 1¼", 1½" diameter, 16 and 18 gauge.



Bases—Wide variety of roof mount bases. Special locking feature. Also available is cast aluminum roof mounts and many other types.

Get the full and complete catalog from your ROHN representative.

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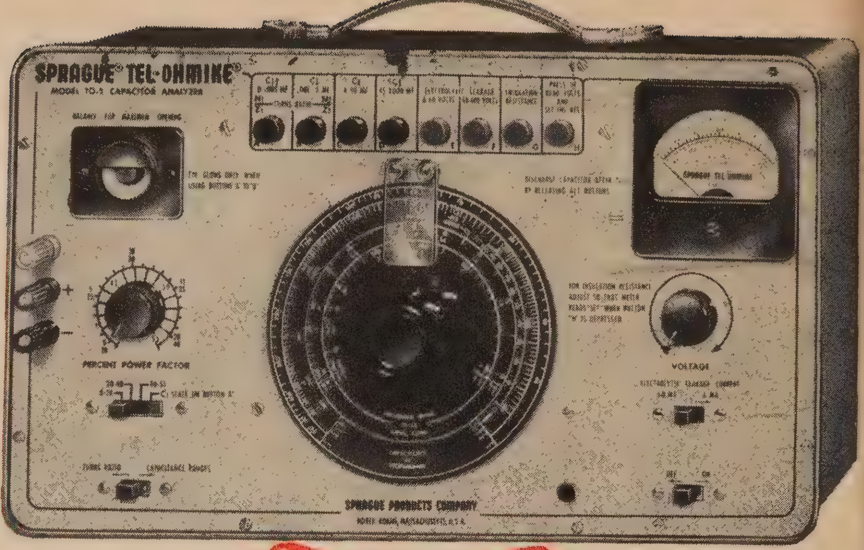
TRY THE TO-5



TEL-OHMIKE®
capacitor analyzer

measures all 4 . . . plus

1 CAPACITANCE	2 POWER FACTOR	3 LEAKAGE CURRENT	4 INSULATION RESISTANCE	extra feature TURNS RATIO
Measures up to 2000 μf in five overlapping ranges . . . including an accurate 1 to 100 μμf range, exclusive with Sprague.	Power factor of electrolytic capacitors is measured by the highly accurate bridge method. Reads up to 55% in three ranges for convenience in measurement.	Leakage current of electrolytics is measured directly on the meter, with exact rated voltage up to 600 v. applied from continuously adjustable power supply. Two ranges—0-6-60 ma.	Insulation resistance of paper, ceramic, and mica capacitors is read directly on meter . . . up to 20,000 megohms.	In addition to its function as a complete capacitor analyzer, the TO-5 also measures the turns ratio of power and audio transformers.

SPRAGUE'S TO-5 TEL-OHMIKE Capacitor Analyzer is one of the fastest and surest ways of measuring . . . capacitance, power factor, leakage current, insulation resistance, and turns ratio. The compactness and accuracy of this easy-to-use instrument make it ideal for general industrial laboratory testing.

The jumbo rotating dial makes meter reading easy. You don't have to turn your head to read this bridge. Special color-keyed pushbuttons permit instant range selection . . . and allow automatic safety discharge of capacitors after testing. Magic-eye tube simplifies bridge balancing for capacitance and power factor measurements.

TO SEE THE TO-5 TEL-OHMIKE IN ACTION . . . CALL YOUR ELECTRONIC DISTRIBUTOR TODAY!

This 4-in-1 test instrument is only 8⅞" high, 14⅝" wide, and 6⅛" deep . . . weighs a mere 12½ pounds. The complete price for . . .

MODEL TO-5 (115 VAC/50-60 cy) . . Only **$83 90 net**

Also available: Model TO-5X for 115-230 V/25-60 cy . . . $89.90 net
Model TP-5RM for rack mounting . . . . . $93.90 net

SPRAGUE®
world's largest capacitor manufacturer

SPRAGUE PRODUCTS COMPANY, DISTRIBUTORS' DIVISION OF SPRAGUE ELECTRIC COMPANY, NORTH ADAMS, MASS.

"Don't be a VIDIOT!"

That's the screaming headline of an aggressive advertising campaign in mass consumer magazines. Its purpose is to convince TV owners of the desirability of buying replacement picture tubes using new glass envelopes. The advertiser is Kimble Glass Company, a subsidiary of Owens-Illinois.

The ad defines a "Vidiot" as a person who pays the new price for a rebuilt picture tube.

We believe that the consumer could benefit by proper education. This ad does not do it!

On the contrary, it is in poor taste and raises some questionable implications. No doubt a number of people find it offensive, if not downright insulting, to be told that they are idiots for not recognizing the difference between new and rebuilt picture tubes. It is doubly annoying that the consumer's irritation should once again be directed to something relating to TV. There is the possibly unintentional implication that the technician pulled a fast one.

The ad carefully refrains from saying explicitly that a picture tube using new glass actually performs better than one with reclaimed glass. However, the ad does *imply* to the consumer that it is better. Comments such as "They look alike . . . but they are *not* alike," are used.

We do not begrudge Kimble the right to sell as many picture tube envelopes as they can. And they certainly are correct in saying that the consumer has a right to know whether or not the glass is new.

But they are twisting the facts when they say, "Your most reliable guide is the manufacturer's warranty tag that says a particular tube is New . . . and has all-new parts and all-new glass." The fact is that a consumer's most reliable guide is the reputability of the manufacturer, *regardless* of whether the glass is new or used.

Though glass manufacturers have tightened their production tolerances, we do not believe that they can show any measurable improvement in picture performance over tubes using glass reclaimed by a high quality tube manufacturer. The electron gun in good rebuilts is brand new, and frequently the screen is too. Glass is a most durable material, if it does not crack. That is why milk bottles are used and reused many, many times with no deterioration in performance.

It is probable that set manufacturers would use rebuilt tubes if Government regulations did not require the elimination of the new label from the entire set.

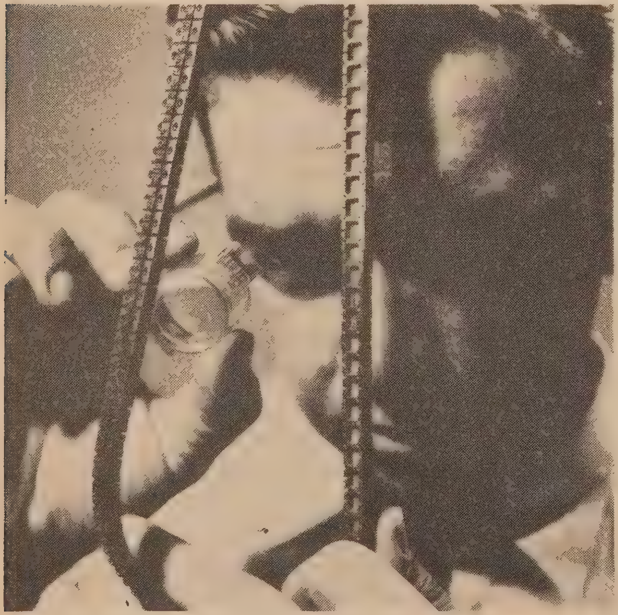
So the next time one of your customers asks you about new and rebuilt picture tubes, let him know that he can obtain excellent performance from a rebuilt *as long as it was made by a high quality manufacturer.* For those who want an all-new tube, they may be obtained at higher cost.

In any case, it does not seem like good business to call a customer by a name which impugns his mental normality. We propose that Kimble correct the abuses noted.

Tuning In the

BUY AMERICAN, was the keynote of a talk by widely known electronics industry executive, Helen Quam. Mrs. Quam cited what she termed ruinously low prices quoted on Japanese-made components delivered in this country, resulting in real hardship among American workers. Mrs. Quam further pointed out the economic tragedies that might result in future years if the American brand products are not supported. JAPAN IS AIDING AMERICA, is the substance of a declaration by a delegate from Japan. In addition, an official of the 80-year-old giant electric industrial company, Toshiba, said, ". . . many prominent American manufacturers are directly affiliated with our large Japanese industries and, in fact, are substantial stockholders." Stating that last year U.S. exports to Japan were $829,488,593, while U.S. imports from that country amounted to $673,951,285, he commented, "It is obvious that American industry and American workers are the greater beneficiaries."

ELECTRONIC PRINTER



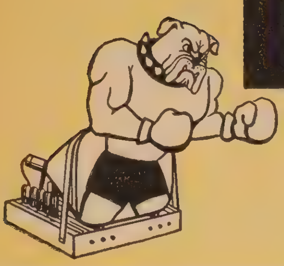
IBM's new 1403 Printer gets an electronic boost with a high-speed alphabet chain. In operation, the chain travels horizontally across the face of paper forms at a speed of 90 inches a second. A fixed row of electronically-timed hammers is in line with the whirling chain. As the printing chain moves, the impact of hammers against individual type numbers and letters causes them to print in precise registration.

A TV CAMERA may be watching you. Whether you walk into a department store, bank or warehouse, there's a chance that your movements are under surveillance of a closed-circuit TV camera. The Burns International Detective Agency, said to be the world's largest, reports that industry is turning increasingly to TV, and electronically-tripped cameras for protection against thieves. The famous detective agency established an electronics division three years ago and the agency's president says it is growing fast.

BUILT-IN TIMERS for TV sets are meeting with much consumer interest, reports a GE executive. In a survey conducted by the Telechron Timer Marketing Research Unit, 76% of the people with bedroom sets said they enjoy regular night-time viewing; 51% of these night viewers reported they fall asleep with the set on; 59% stated they would buy a portable equipped with the automatic shut-off.

TECHNICIANS' TRAINING AIDS program approved by the EIA. The initial step of the new program will involve preparation of films and a manual on customer relations and salesmanship, geared towards the service technician. A spokesman said that the independent service industry will benefit by providing technicians with an opportunity to learn the fine points of handling customers and selling services.

TRANSISTOR factory sales during the first seven months of this year more than double last year's comparable period sales. A total of 42,128,291 transistors were sold January through July, according to the EIA, for a dollar total of $115,432,090.



"Tough Dog" Corner

Difficult Service Jobs Described by Readers

Over-Heating Flyback

This RCA KCS68C had no high voltage when brought to the shop. Tubes had been substituted in the home and failed to correct the trouble.

After checking voltages at the horizontal oscillator and determining that proper waveforms of correct amplitude were arriving at the grid of the 6CD6 horizontal output tube, the flyback was checked with a fly-back tester and it proved defective.

A new direct replacement transformer was installed and high voltage was restored. However, the raster barely filled the screen and in a short time the insulating material on the flyback became soft, indicating overheating. I next changed the horizontal output and damper tubes, checked and adjusted grid drive, width and the horizontal linearity coil. All voltage checks in the horizontal output and damper section indicated no cause for doubt in this area.

A closer inspection of the fly-back transformer revealed that the coil form at one end was overheating and gradually heating the rest of the transformer. Tests showed that in one minute of operation the head of the brass screw and washer would heat up to the point where it would burn my hand on contact. The brass screw was used as a tie point to the 6CD6 plate and removing this connection did not affect heating. See Fig. 1. The transformer was dismantled and inspection disclosed all the elements necessary for small-scale induction heating—the high frequency current-carrying work-coil and metal washers representing the work-piece in the magnetic field. I remembered about thermal conduction from the work-piece in induction heating gradually heating other parts and reassembled the transformer with fiber washers substituting for the iron washers and spacers.

The set now performed correctly with width to spare. The transformer showed no signs of overheating after many hours of continuous use.—*Howard E. Chace, Southbridge, Mass.*

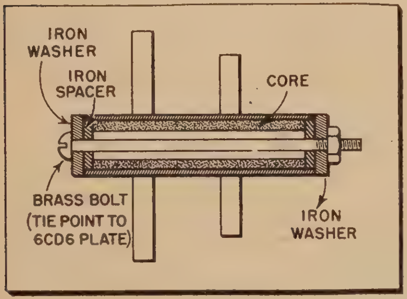


Fig. 1—Loss of normal raster width and severe overheating of transformer resulted from use of metal washers in this flyback.

Unstable Sync

A Silvertone model 6170 was taken to the shop for no raster. The repair was more or less routine. An open electrolytic condenser in the boost supply was causing a drop in high voltage and the consequent loss of raster, so I replaced it.

I air tested the set, adjusted the tuner slugs and made my delivery. Once the chassis was bolted into place, however, I found much to my surprise that the set did not perform well at all. Out of the seven operating channels only two programs would hold still. The others had very poor vertical stability with practically no lock whatsoever.

My first thought was that a tube might have gone sour so I checked them. With that possibility out of the way I looked at the indoor antenna and tried a new one but the poor vertical sync was still with us. I wanted to blame the reception area, as the location was in the midst of many apartment buildings, but my better judgment told me not to.

The perplexing fact about the whole situation was knowing that the set performed fine in the shop. I wondered if something had been jarred or moved during transport to bring on the trouble so I pulled the chassis out of the cabinet and inspected it, paying close attention to the sync output and integrator circuits. Everything appeared to be in order.

At this point the customer, who in the meantime was busying herself in the kitchen, walked in and asked how things were coming along (probably wondering what was taking so long). I sadly confessed that the situation could be better and then asked if the set had ever acted this way before. Indeed it had—in fact, she said, ever since the set had been previously repaired.

Now I tried to put the pieces together. The picture rolled before I took the set away; didn't while in the shop and now was rolling again. I remembered something. A piece of metal strip in the bottom of the cabinet. In a flash it came to me—the picture tube and its harness were not grounded and that was probably the trouble. The grounding strap had been broken off on the previous repair and had fallen to the bottom of the cabinet. I took it out, soldered it back into place, and when the set was switched on again the pictures all snapped right into place with perfect vertical stability. —*Frank A. Salerno, Long Island City, N.Y.*

TOUGH DOGS WANTED!

$10 for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do. Photos are desirable. Unacceptable items will be returned. Send your entries to "Tough Dogs" Editor, ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

Conquer Obscure Video Defects

Square-Wave Tests Identify "Ringing" & "Transient" Distortions

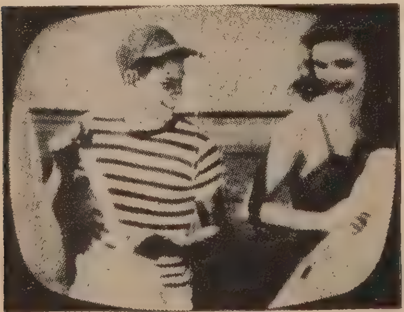
RAY MANSFIELD

The video amplifier makes an important contribution to picture quality. Distortion in this TV section often causes circuit ghosts, fuzzy picture edges and picture smear. Square wave tests can give valuable information regarding its operation, including:

- *Frequency response*
- *Phase characteristics*
- *Ringing*
- *Overshoot*

• A single section of a TV receiver, the video amplifier, is often responsible for the essential quality of a picture. Its function is somewhat analogous to that of an audio amplifier; amplifying a signal to a sufficient magnitude in order to drive the end product, in this case, a CRT. However, the TV set designer has to contend with an amplifier that should have a good response in the frequency range of about 30 cps to 4 mc. Now, compare this with the typical high fidelity audio amplifier requirement of 20 cps to 20,000 cps and you can visualize the design problems encountered in the quest for TV picture quality. Fortunately, though, our visual sense is not as critical as our aural one; nor are the gain requirements comparable to audio amplifier needs.

Fig. 1—Diminishing repeated picture outlines caused by video amplifier ringing.



An occasional source of irritation produced by the video amplifier is "ringing." Sometimes there is only one visible repeat in the picture outline; in other cases many repeats of diminishing intensity are seen. The symptom, repeated picture outlines, as shown in Fig. 1, may be misinterpreted as antenna ghosts. However, picture ringing, also known as circuit ghosts, should never be confused with multi-path ghosts received from the antenna.

Identifying Ghosts

Ghosts are generally developed from one of three sources: Antenna, video i-f, and the video amplifier. The two latter sections, video i-f and amp, may produce picture ringing. It is easy to distinguish ringing from antenna ghosts. Simply view the picture on each channel. If similarly spaced repeated images are displayed on all channels, then the trouble is ringing. Antenna ghosts will differ from channel-to-channel.

Once this has been determined, the circuit ghost-producing section must be isolated. Is it the video i-f or the video amplifier? It is the video i-f if rotating the fine tuner, thereby altering the response curve of the usually-staggered i-f's, will result in the circuit ghosts being displaced from its previous position. If the multiple images remain in the same position, rather than moving around when the fine tuner is rotated, the defect is in the video amplifier section.

One word of caution concerning ringing; all TV receivers exhibit a certain degree of ringing in order to obtain a sharp picture. The defect referred to occurs when the ringing is of a disturbing nature. Very close inspection of a transmitted picture will usually indicate a slight amount of ringing which is not disturbing under normal viewing conditions.

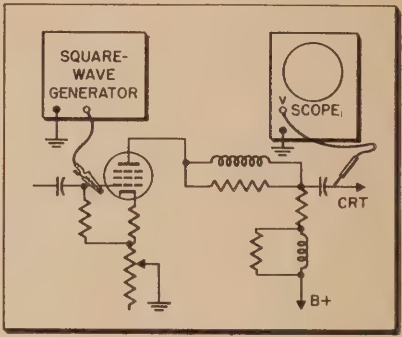
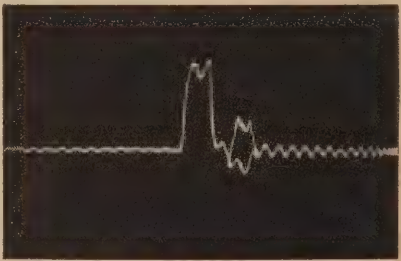


Fig. 2—Simple square-wave generator and scope set-up for identifying TV ringing.

A video amp's ringing is usually a result of excessive gain at the high video frequencies. This is frequently due to defective peaking coils or damping resistors. An excellent method to test and analyze for circuit ghosts is by means of square waves. This results from the fact that a video signal has sudden transitions, just as a square wave has abrupt leading and trailing edges.

The simplest type of square-wave

Fig. 3—Horizontal sync pulse and color burst distorted by ringing in amplifier.



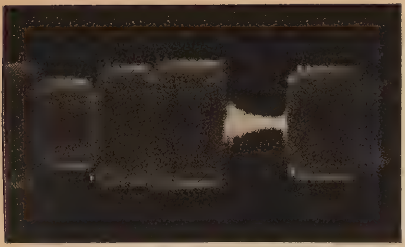


Fig. 5—Ringing bar envelopes of 3.58 mc chroma signal from high peaked amplifier.

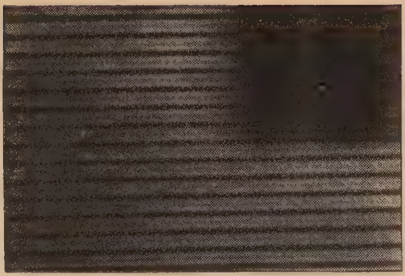


Fig. 6—"Soft" indefinite outlines of two dark areas indicates corner rounding fault.

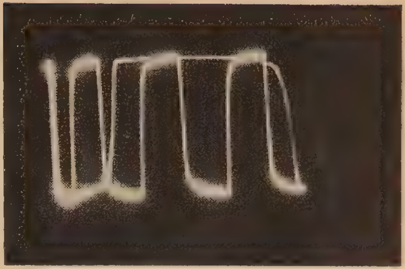


Fig. 7—Cause of "soft" edges is revealed by rounded edges of square waves on scope.

test is made by applying the output from a square-wave generator to the input of a video amplifier and connecting a scope to the output of the video amplifier. See Fig. 2. Useful tests can be made at high frequencies, such as 100 kc. 60 cps may be used for any low frequency tests.

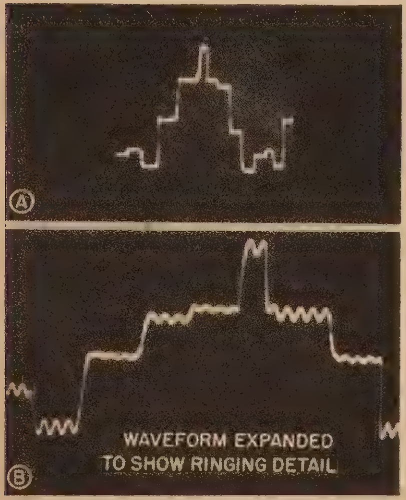
Ringing Distortion

Fig. 3 shows how a ringing amplifier can distort a horizontal sync pulse and color burst. This is a case of damped ringing. The transient oscillation is large at the initiating pulse edge, and then decreases in amplitude.

We may note some interesting and perhaps unexpected responses in amplifiers which ring strongly. For example, Fig. 4 shows a Y signal as reproduced by a good video amplifier, and by an amplifier which rings badly. The odd feature in the distorted waveform is that some of the gray levels ring strongly while others ring weakly.

The difference in ringing amplitudes is caused by ringing "hangover" from one gray level to the next. The transient oscillation is not highly damped. The ringing which starts at one level change carries over to the next level change. In certain instances, we see that the "hangover" is opposed by the ensuing transient oscillation, in others, aided. This depends in each instance on the exact duration of the gray level.

Fig. 4—(A) Y signal is being reproduced properly by a normal functioning amplifier. (B)—Same signal rings strongly in video amp having a sharp high-frequency peak.



The same highly peaked amplifier rings a 3.58-mc chroma signal as seen in Fig. 5. The bar envelopes ring just as a square-wave signal rings. This points up the general utility of a square-wave test in checking the transient response of an amplifier.

High Frequency Tests

A good video amplifier will reproduce a 100-kc wave without excessive overshoot, ringing, or corner rounding. These faults give rise respectively to black or white outlines in the edges of pictures and "soft" indefinite picture edges, in addition to circuit ghosts.

The beam current in the picture tube never transits from white to black, or vice-versa, in zero time. Instead, edge distortion of some type will always be present. Illustrated in Fig. 6 is an example of corner rounding. The edges of the dark areas are "soft", instead of sharp and abrupt.

The cause for "soft" edges is immediately apparent in a high-frequency square-wave test. As shown in Fig. 7, the corners of the square wave are rounded off instead of well defined.

To improve the corners of a reproduced square wave, give attention to the values of plate-load resistance and peaking coils in the video amplifier circuit, illustrated in Fig. 8.

Overshoot Distortion

A typical example of overshoot, as seen in Fig. 9, causes picture edges to be outlined in black or white. We often find overshoot accompanied by some ringing. On the other hand ringing (circuit ghosts) can occur without overshoot. It all depends on the characteristics of the circuit configuration. It results from lack of flat frequency response in the video amplifier. The frequency response can be made uniform by attention to peaking-coil inductances and damping.

The peaking coils are damped to some extent by the internal resistance of the circuit, but in addition, a damping resistor of approximately 10-k to 30-k ohms is required across the series peaking coil L_1, shown in Fig. 8.

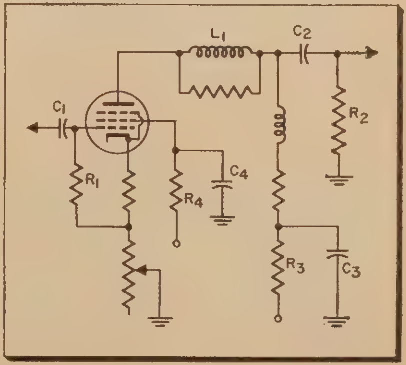
Low Frequency Tests

Using a 60-cycle square wave, if the reproduced waveform has considerable tilt, as seen in Fig. 10, picture shading will vary from top to bottom of the screen giving an impression of a smeared picture. The tilt must be corrected by attention to the time constants in the video-amplifier circuit shown in Fig. 8.

Tilt distortion can occur in the grid-coupling circuit C_1R_1 unless the product of R and C is sufficiently high. Likewise the output coupling circuit C_2R_2 must have an adequate time constant, as must R_3C_3 and R_4C_4. Tilt

(*Continued on page 94*)

Fig. 8—To improve corners on reproduced square wave, give attention to values of plate-load resistance and peaking coils.

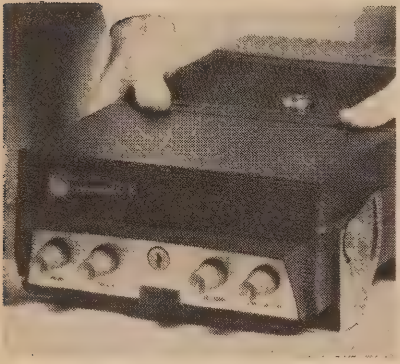


Choosing A Mobile Radio System

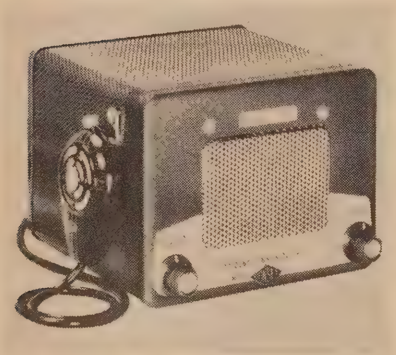
A Selective View Of 2-Way Radio Sales & Installations

ALLAN LYTEL

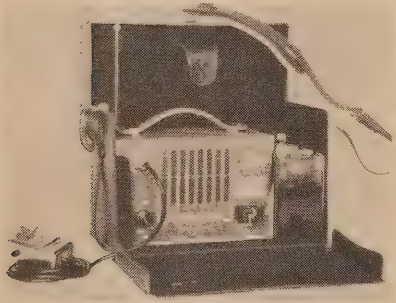
General Electric



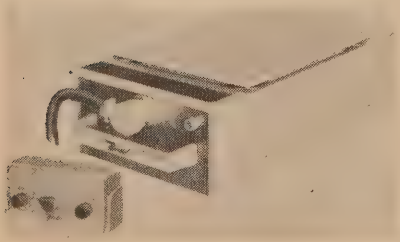
Gonset



Vocaline



Bendix



Depending upon particular use or need, a wide variety of two-way mobile radio installations are possible. Equipment must therefore be selected to meet specific needs. Consultations and close cooperation with the prospective user is most desirable in order to achieve satisfactory results. Intelligent advice and final selection of equipment require the technician to have a thorough knowledge of basic mobile systems.

• A frequently neglected, though profitable, field open to the electronic technician with the proper FCC license is mobile radio sales and service. In order to issue the professional advice expected of him, the technician should have a well-rounded knowledge of basic mobile systems. The selection of a system is naturally predicated on its intended use, available space and cost, and the expert should be aware of the choices open to him.

Typical System

A typical mobile radio system begins, for example, with a fleet of trucks used for pickup and delivery in a metropolitan area. One fixed base station and several mobile stations are used for a two-way radio network. More mobile stations can be added at any time and, as the traffic area expands, the system can be enlarged to give wider communication coverage by using repeater stations at several strategic points.

The usual system employs one frequency although some installations have a need for several channels. A typical case would be a large installation where vehicles are speaking to each other and the base station wishes to call a third mobile unit on another stand-by frequency.

Various types of control are possi-

(Text continued on page 44)

Fig. 1—Typical mobile base station, A, with remote control facilities at B. Two-way conversations from either point may be carried on with C, D, or other vehicles in the field.

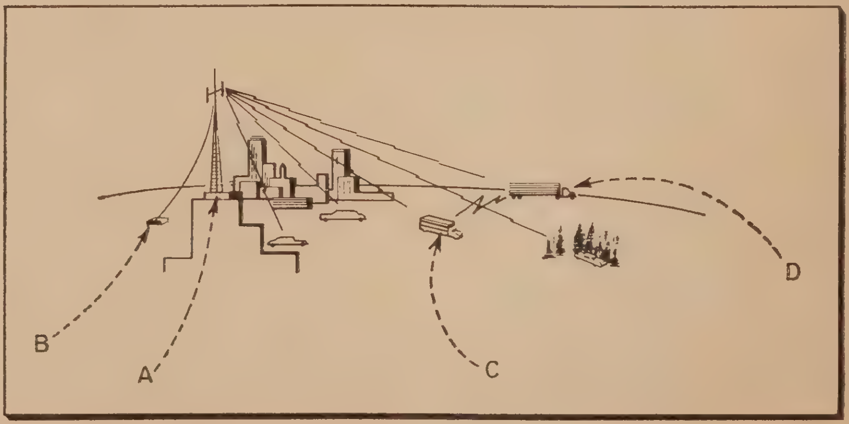


TABLE 1

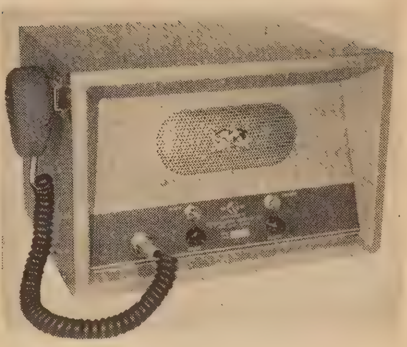
Service		FCC Rules
AVIATION	All commercial and private aircraft and ground stations	Part 9
AMATEUR	Non-commercial hobbyists and experimenters	Part 12
CITIZENS	All citizens not otherwise eligible for other licenses	Part 19
EXPERIMENTAL	Commercial research and development	Part 5
INDUSTRIAL	Business enterprises	Part 11
Power	Electric, gas, steam and water public utilities	
Petroleum	Petroleum product prospectors, producers, refiners and pipeline operators	
Forest	Timber and logging companies	
Relay Press	News services and newspapers	
Motion Pic.	Motion picture studios	
Business	Any business enterprise	
Special	Any manufacturing, construction or production activity in a rural area (including forming) or in an urban area within limitations	
LAND TRANSPORTATION	Common and contract carriers of passengers and freight	Part 16
Railroad	Railroad operating companies	
Taxicabs	Taxicab operators	
Motor Carrier	Common or contract carrier transportation	
Auto Emerg.	Public garages and auto clubs	
MARINE	All commercial and private land stations for maritime communications	Part 7
	All marine utility (portable) stations on land or shipboard	Part 7
	All commercial and private radio equipped vessels	Part 8
PUBLIC SAFETY	Agencies protecting life and property	Part 10
Police	Municipal, county and state police	
Fire	Municipal and volunteer fire dept.'s	
Forestry-Conservation	Governmental and private forest protection	
Highway Maint.	Governmental operation, supervision and maintenance of public roads	
Special	Disaster relief organizations	
Emergency	Physicians and veterinarians in rural areas	
	Ambulance and rescue squads	
	Communications common carrier standby	
	Isolated area communications	
	Communications common carrier emergency	

TABLE 2

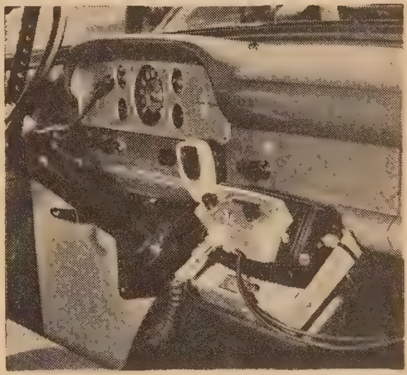
Other Frequency Bands Related to Commercial Mobile Radio

Band (mc)	Service	Notes
1.6-5.0	Restricted to special commercial use	Long-range of 25-50 miles or more
72.0-76.0	Point-to-point Use	Use must not cause television interference
118.0-132.0	Airport Service	Ground-to-ground at airports (AM not FM)
132.0-144.0 162.0-174.0	Reserved for Government Use	—
462.55-463.20 464.74-464.95 465.05-466.45 (460.05-460.95 also presently used)	Citizen's Band (A)	Maximum power 60 watts, FM and AM stations 50 kc apart, for two-way radio telephone
462.525-467.475	Citizen's Band (B)	Maximum power 5 watts, AM or FM for remote control, stations 10 kc apart
26.995, 27.045, 27.095, 27.145, 27.195 and 27.255	Citizen's Band (C)	Maximum power 5 watts (except on 27.255 where it is 30 watts), On-off carrier or AM tone only, NOT for radio-telephone, for mobile radio control only
26.965-27.035 27.005-27.085 27.105-27.135 27.155-27.185 27.205-27.225	Citizen's Band (D)	Maximum power 5 watts, AM two-way radio-telephone, stations 10 kc apart

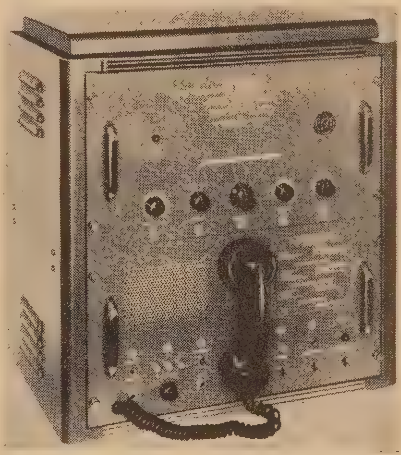
Comco



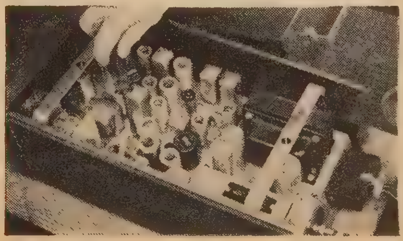
Motorola



RCA



Du Mont



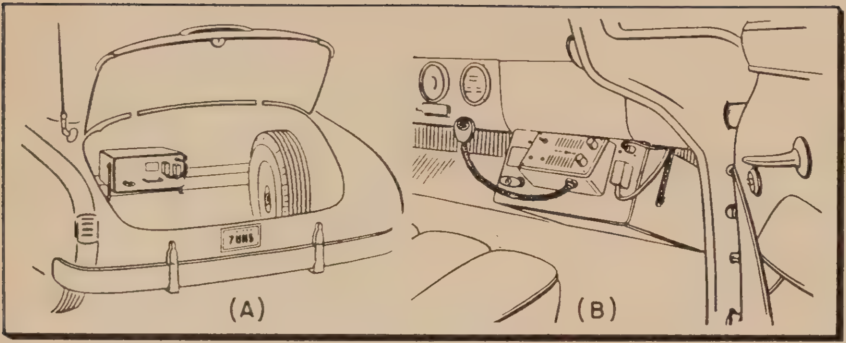


Fig. 2 (A)—Trunk installation of two-way mobile system with location of antenna providing short lead to equipment. (B)—Two-way radio mounted under dash board of mobile vehicle.

(*Continued from page 42*)

ble. Local control is usually used when the operator is immediately adjacent to the transmitting and receiving equipment. In extended local control the distance between the operator and the equipment is about 50 feet or less and speech preamplification is not required. Whenever it is desirable to locate the transmitter a considerable distance from the operating position, on a hill-top for example, remote control is used. Accordingly, a speech amplifier is necessary to provide normal audio signals over the wire-line to the transmitter.

In a typical dual-point control arrangement, as shown in Fig. 1, the base station is located at A, near the fixed antenna. Two-way conversation may be carried on from one or more local control positions from point A, or from one or more remote control positions from point B. Dispatching or two-way conversation with any vehicle may be carried on from either point. Floor control switches can free both hands of the operator. Monitoring units may be used at either point to permit personnel to hear both incoming and outgoing messages. Vehicle D, equipped with two-way radio, may also speak to any other vehicle in the system.

Design

Mobile radio equipment varies widely in design and construction. Base stations are usually operated from a-c power lines with power inputs from 30 to 250 watts. A mobile station is operated from the vehicle battery—6 or 12 v. d-c. The mobile transmitter normally has an input power of 25 to 100 watts, although it can be higher. Receivers are generally single frequency tuned but they are also available for two-channel reception, using two different local oscillators. The receivers are adjusted to a specified frequency at the factory and local oscillators are typically crystal controlled. Single, double and triple conversion superhetrodynes are used, and some systems include afc. Selectivity between 20 and 40 kc, or better, with one microvolt or less sensitivity is common. Radio receivers for mobile use are designed with squelch circuits—to prevent disturbing high noise level output from the speaker when no signal is being received.

Scope

While mobile radio began as a tool for emergency communications it has expanded because of its recognized cost and time-saving features. According to the FCC, safety and special radio services comprise the largest number of authorized stations, embracing all radio transmitters excepting broadcast, common carrier and experimental.

The number of transmitters in use have expanded annually and by the end of June, 1958, about 1,400,000 transmitters were on record. This statistic is not only a result of a slow growth throughout the years; authorizations have doubled in the past five years. Safety and special service facilities may be seen in Table 1. Other frequency bands are listed in Table 2.

Frequency Shortage

Its rapid growth has created the need for more frequency allocations. A number of solutions have been offered for utilizing available space more effectively. Cooperative efforts on the part of users, manufacturers and the FCC, have relieved the situation from time to time by channel splitting, sharing of channels and highly significant design improvements in both FM and SSB transmitters and receivers.

Tighter frequency deviations have been prescribed by the FCC. A ± 5 kc deviation has been adopted as standard for land mobile service transmitters in the 25-50 mc and 152-162 mc bands. A ± 15 kc tolerance was established for the 450-460 mc bands. See Table 3. Numerous other methods are being explored to obtain greater available air-space. These include: Prevention of harmonic radiation, use of directional antennas to confine radiated energy in specific areas, reduced power for some transmitters to required minimum, carrier off-set operation, greater frequency sharing, and different improved modulation systems.

Installation

Installation of a mobile radio in vehicles differs with the type of equipment and the type of vehicle. Every installation should be made for both convenient operation and consideration of maintenance ease. A definite layout plan for the radio,

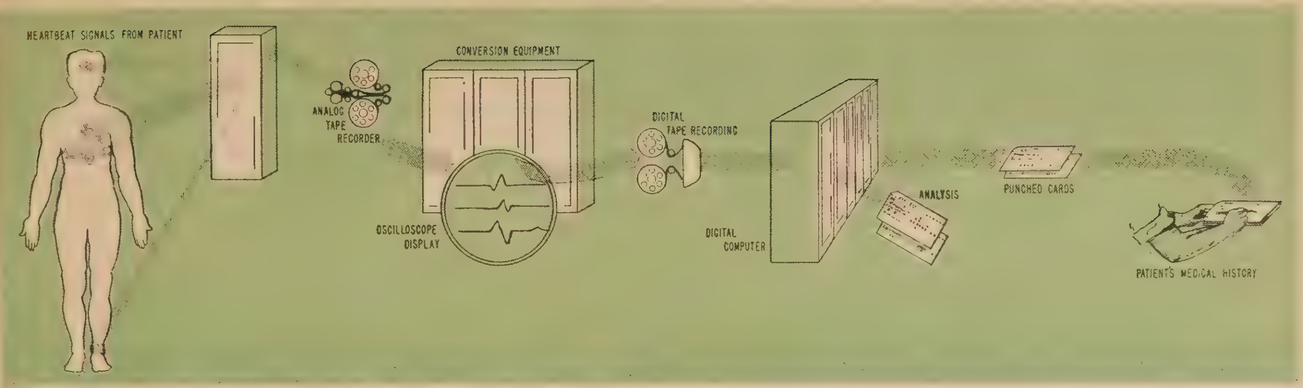
(*Continued on page 62*)

TABLE 3

The Important Mobile Radio Frequency Bands for Commercial Use

Band	Range**	Channel	Spacing	Frequency Tolerance	Deviation
(mc)	(miles)	Old	New	(percent)	(kc)
25-50	25-60	40	20	0.002	5
152-162	10-30	60	15*	0.0005	5
450-460	10-25	100	50	0.0005	15

*Alternate channels are used; the spacing is thus 30 kc.
**Range is comparative only. It depends upon transmission conditions and power output.



Computer Analyzes Human Heartbeat

Electronics Helps Diagnose Heart Diseases

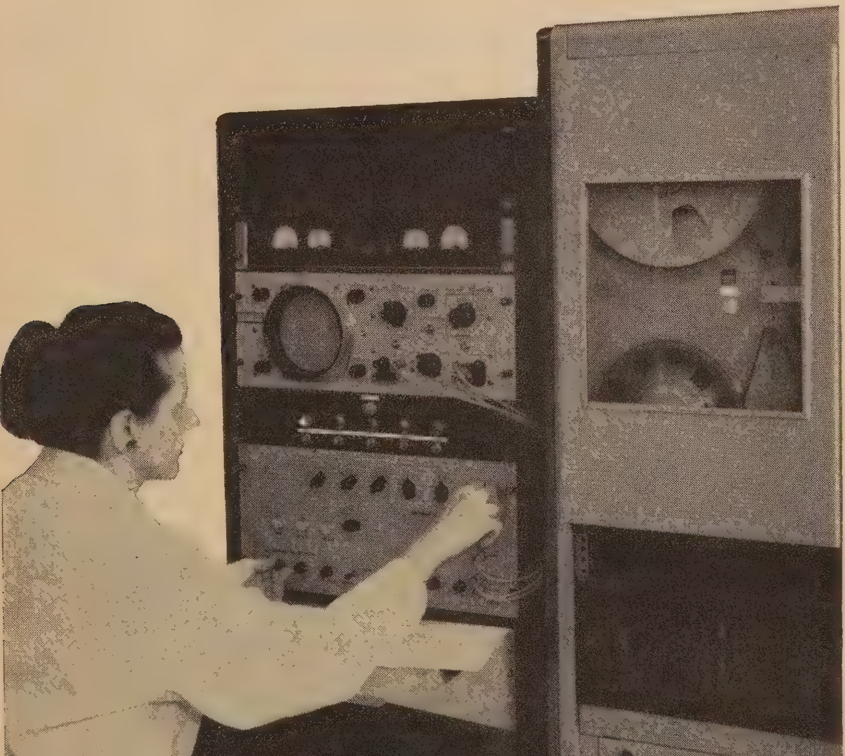


Fig. 1—Aiding in a medical diagnosis of heart disease, the analog-digital converter changes heartbeat data to a form suitable for use in a high-speed computer. Part of the computer equipment is shown with a medical technician at monitor and control position.

The National Bureau of Standards

• Electronics is playing an invaluable part in combating one of man's great killers, heart disease, through diagnostic and therapeutic equipment. In line with the medical role played by electronics in the past, the National Bureau of Standards has developed a computer to compare and analyze heartbeat information. The development work was sponsored by the Veterans Administration.

Using magnetic tape to record heartbeat data and a high-speed digital computer to compare these records, a physician can make an objective diagnosis of a patient. Although much work has been done on the relationship between heart disease and electrocardiograms, diagnostic methods are largely based on practical experience, rather than an accurate scientific method. To achieve a more scientific means of diagnosing heart disease it is desirable to analyze a greater number and variety of heartbeat records to establish accurate limits of normality.

Adequate statistical studies are feasible through use of magnetic tapes and high-speed computers. These tapes have the advantage of being able to store enormous amounts of data that can be used quickly and efficiently for comparing past records with new ones.

Operation

The new development has been designed to perform a conversion process. Heartbeat data is recorded on magnetic tape as continuous waveforms (electrocardiograms) and are

(*Continued on page* 60)

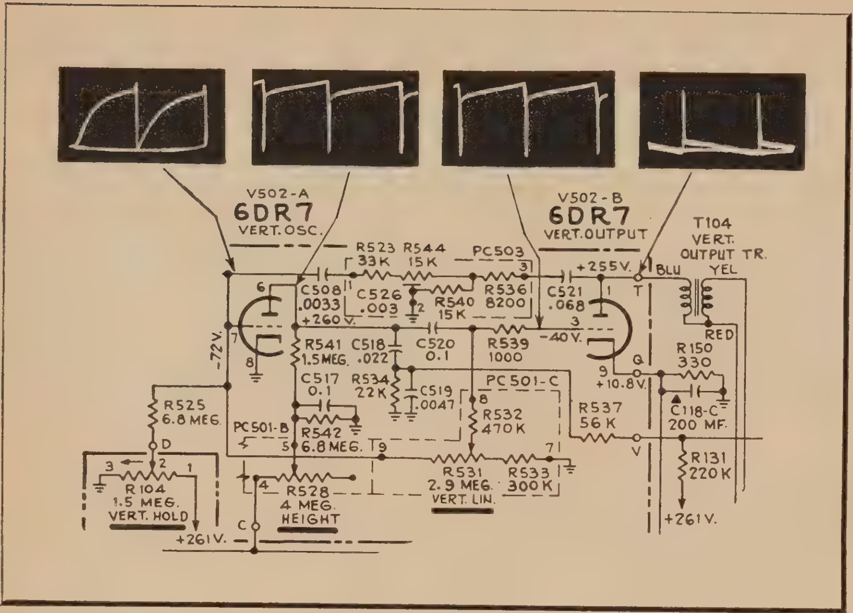

V502-A
6DR7
VERT. OSC.
V502-B
6DR7
VERT. OUTPUT
T104
VERT.
OUTPUT TR.
BLU
YEL
RED
R523 33K
R544 15K
PC503
+255V.
C508 .0033
C526 .003
R540 15K
R536 8200
C521 .068
+260 V.
-40 V.
-72V.
R541 1.5MEG.
C518 .022
C520 0.1
R539 1000
R150 330
+10.8V.
C517 0.1
R534 22K
C519 .0047
PC501-C
R525 6.8 MEG.
PC501-B
R542 6.8 MEG.
R532 470K
R537 56K
C118-C 200 MF.
R131 220K
R104 1.5 MEG. VERT. HOLD
R528 4 MEG. HEIGHT
R531 2.9 MEG. VERT. LIN.
R533 300K
+261V.
+261V.
T
Q
V
D
C

Fig. 1—Schematic of an RCA KCS-128A vertical multivibrator and sweep output circuit.

Approach To Printed Circuit Servicing

Industry Service Aids Simplify Repairs

BERNARD GREEN

• The introduction of printed circuitry was a severe jolt to the service technician's *modus operandi*. The need for revised repair techniques and new tools created a furor in the trade. However, technicians are now fully aware of the major part played by printed circuits, since they form an integral part of a technician's workday life. Continued familiarization with printed circuit repair techniques should minimize or eliminate many earlier difficulties.

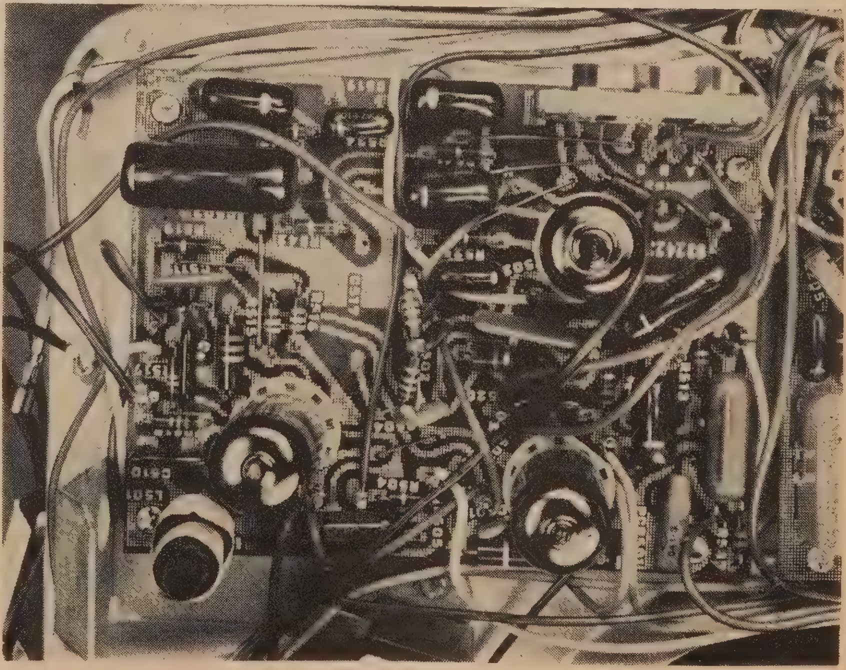
Servicing Approach

Approaching a repair job with the proper tools and the knowledge to use them is a tremendous asset in any type of service work. This is certainly true of printed circuiting servicing.

Many technicians, in their initial zeal to deprecate printed circuits, overlooked at least one important advantage frequently offered by it that cannot be matched by their hand-wired brothers—the possibility of repairing a "shop job" set without removing it from its cabinet. As you well know, it often takes more time to remove a chassis from a cabinet and set up the set with yoke and CRT than to make the actual repair. Printed circuits, with components facing the service technician, therefore present an opportunity to effect repairs in a minimum of time.

Manufacturers have become more aware of the technician's service needs and many have now included circuit tracing aids in the form of color-coded printing right on the circuit board itself. Component stock numbers, identification of B+, agc, test points and other voltage lines, are helping the technician im-

Fig. 2—A pictorial circuit view of the schematic in Fig. 1 illustrates easy component identification. The board has been reversed to coincide with the diagram view of Fig. 3.



> *Printed circuitry has come a long way since its Proximity Fuse days. No one knows this better than the service technician, who is confronted with this new production technique on a daily basis. Manufacturers using printed circuitry in their radio-TV sets have provided the technician with numerous service aids to facilitate quick, efficient service. Revised service techniques and specialized tools enable the technician to meet this latest contribution to the industrial revolution with assurance.*

measurably. In addition, service data information has been expanded to encompass a practical view of printed board circuit tracing to further simplify the technician's work.

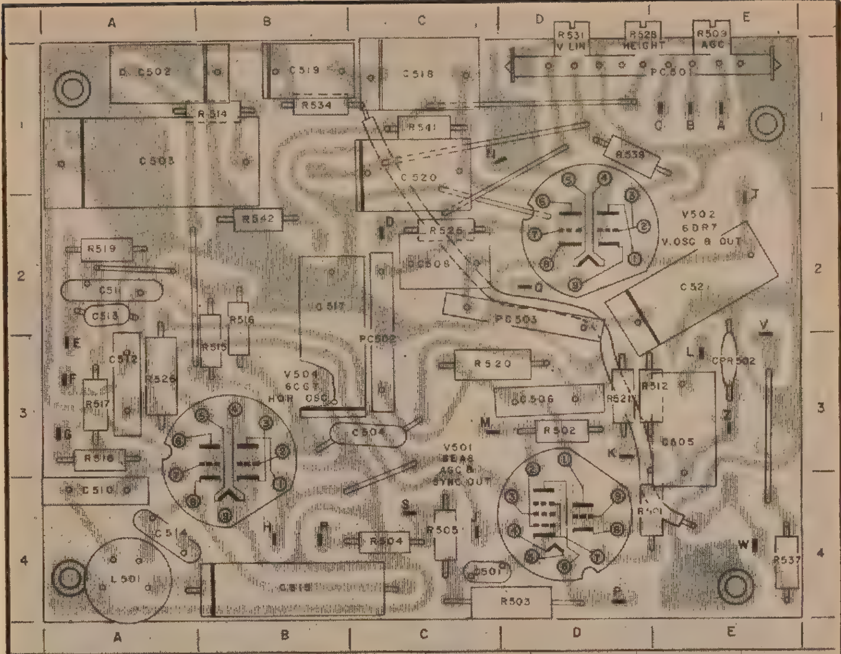
Many of the old gripes no longer exist. Printed circuit board strength has been increased, for example. Production quality has been improved. This doesn't mean that electronic's panacea has been found, but it does indicate that efficient service of products incorporating printed circuitry is not only feasible, but practical too.

Troubleshooting

Let's look at a modern TV set using printed circuits; an RCA chassis KCS 128A. Assuming a complaint of "no vertical deflection," the vertical oscillator and output dual tube, 6DR7, would be replaced after removing the back cover. If vertical deflection was still absent, the schematic may be looked at, as shown in Fig. 1. The receiver obviously uses a feedback circuit from the output stage to form an oscillator feedback loop. The oscillator is a multivibrator type.

Visually inspecting the vertical section of the printed circuit board, shown in Fig. 2, for signs of burnt components, broken leads, etc., everything appears normal. Looking at the schematic, we notice that the components are clearly referenced to the actual printed board, with identi-

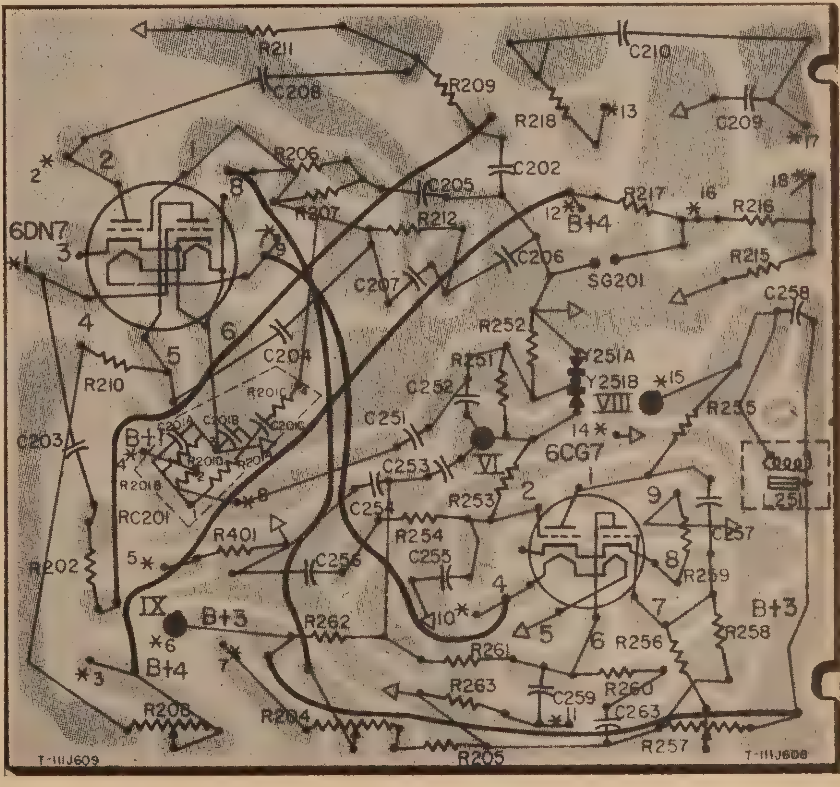
(*Continued on page 80*)


A
B
C
D
E
1
2
3
4
R531 V LIN
R528 HEIGHT
R509 AGC
PC501
C502
C519
C518
R514
R534
R541
C503
C520
R539
V502 6DR7 V.OSC & OUT
R542
R525
R519
C506
C511
C513
C517
C512
R516
R515
R528
PC503
C521
PC502
R520
V504 6CG7 HOR OSC
R517
C506
R521
R512
CPR502
R518
C504
R502
C505
C510
V501 BIAS AGC & SYNC OUT
R501
C514
R504
R505
L501
C515
C501
R503
R537

C501	C4
C502	A1
C503	A1
C504	C3
C505	E3
C506	D3
C508	C2
C510	A4
C511	A2
C512	A3
C513	A2
C514	A4
C515	B4
C517	B2
C518	C1
C519	B1
C520	C1
C521	E2
CPR502	E3
L501	A4
PC501	D1
PC502	C3
PC503	D2
R501	D4
R502	D3
R503	D4
R504	C4
R505	C4
R512	D3
R514	B1
R515	B3
R516	B2
R517	A3
R518	A3
R519	A2
R520	C3
R521	D3
R525	C2
R526	A3
R534	B1
R537	E4
R539	D1
R541	C1
R542	B2

Fig. 3—Diagrammatic location guide is a service aid in pin-pointing location of component.

Fig. 4—Facilitating circuit tracing and parts location, GE indicates tube types, test points, grounds, etc. in non-conductive yellow paint directly on a printed circuit board.


R211
C210
C208
R209
R218
13
C209
17
2
2
1
R206
C202
18
8
C205
R217
16
R216
6DN7
R207
R212
12
B+4
3
9
C206
R215
1
C207
SG201
C258
4
R252
6
Y251A
5
C204
R251
Y251B
15
R210
C252
VIII
R255
R201C
C251
14
C203
B+1
C201A
C201B
C201C
6CG7
R201D
R201A
VI
R201B
C253
L251
8
C254
R253
2
9
RC201
R401
R254
C257
5
C256
C255
8
R202
4
R259
10
IX
B+3
R262
5
7
B+3
6
6
R256
R258
B+4
7
R261
3
R263
R260
R208
C259
C263
R204
11
R205
R257
T-111J609
T-111J608

What's Your Service Score?

Periodic Customer Relation Reviews Increase Business Effectiveness

Ernest W. Fair

• How good are your service procedures? How effectively do you handle your customers? Do your customer relations enable you to hold your old customers and secure new ones by their recommendations? Just what is your service score?

One of the secrets of any successful service operation is periodic examination of its procedures to discover areas where improvements can be made. The success of this method is dependent on the thoroughness of the check.

Careful analysis of successful programs practiced in selected shops throughout the country, resulted in the questionnaire listed below. It not only serves the reader in rating his own shop and staff, but also suggests additional steps to take toward acquiring additional business.

Completing the following questions by checking either "Yes" or "No" on a chart similar to Fig. 1 will quickly reveal the service score of any radio-TV shop.

1. *Do you handle every service call immediately, or promptly inform the customer why it cannot be done?*

A customer who has been led to believe his service call will receive immediate attention will probably be quite irritated when an unusual delay occurs. Many shops require outside service technicians to "call in" if one of their service calls absorbs an unusual amount of time. This enables the shop to contact the technician's other customers and inform them that their sets will be repaired at a later time. You'd be surprised how this courtesy builds good will.

2. *How is your "good housekeeping" on home service calls?*

Many service technicians spread service cloths around sets before making repairs. Some companies even maintain small hand vacuums in their trucks to enable their technician to clean the normally unexposed areas when the TV set is moved aside for repair. Don't underestimate the effect created by respect for another person's property.

3. *Are you courteous at all times?*

The importance of common courtesies cannot be overemphasized. No one likes a curt reply or poor manners. A service technician works at a hurried pace by necessity and can easily overlook the human relations part of his job.

SERVICE SCORE CHART

Number	YES	NO
1		
2		
3		
18		
19		
20		
TOTALS		

Fig. 1—The service score chart illustrated should be completed at regular intervals. A "Yes" rating of 15 or over is excellent; 10-15 suggests a need for closer service policy inspection; under 10—danger signal.

4. *Do you ever talk "down" or "up" to customers?*

Sometimes experts in their respective field create a poor impression with clients by treating them as ignoramuses. No one appreciates an attitude that is too patronizing. Resentment is also caused by high technical level talks beyond the customer's comprehension. Although well meant, it is misunderstood as an attempt to confuse the real issues.

5. *Is it a standard practice to leave a written guarantee or warranty of labor and parts and live up to it scrupulously?*

A written guarantee builds confidence and leaves a professional business impression with the customer. Your reputation is important; always honor a guarantee issued by your shop.

6. *Does your shop maintain a replacement set in the event that a shop job is held up while either awaiting receipt of a hard-to-obtain replacement part or due to difficulty in locating the trouble?*

TV is no longer a luxury and depriving a customer of a set for an extended period of time will be annoying. In addition, the customer usually "hounds" the technician until the set is repaired and, not fully understanding a parts procurement problem or a service difficulty, will tend to lose confidence in the technician. In some areas, shops automatically loan a set when one is removed from the home. There are shops that maintain a TV rental section and charge a nominal fee when substituting their set for the one removed.

7. *Do your technicians always have the proper service tools and equipment?*

The most skilled service technician may appear to be a "tinkerer" if forced to employ make-shift equipment. Proper equipment should always be supplied to allow a technician to exercise his knowledge and experience in a professional manner.

8. *Do you ever permit anyone lacking proper skill and training, excepting supervised apprentices, to undertake TV repairs?*

During a temporary rush period, shops may be tempted to secure inadequately trained help if skilled technicians are not available. It never pays to hire such individuals. It only results in poor workmanship, "pulled" sets that should have been repaired in the home, or worse, the untrained representative of your shop telling the customer that their set must go to the shop and, the

(*Continued on page 91*)

MASTER TELEVISION ANTENNAS

• Radio and TV technicians have learned long ago that TV or FM receivers are no better than their antenna equipment. This fact is equally true of TV and FM master antenna systems for motels, apartment houses, schools, commercial buildings, etc.

Basically, the master system consists of: (1) antenna, (2) head-end equipment and (3) distribution equipment. Local conditions and individual requirements determine the types of antennas, masts, etc., to be used and the method of installation.

Systems

When all signals originate from one direction, with approximately equal strength, a broad-band all channel "Yagi" or similar type antenna may prove effective. Where both high and low VHF channels are to be received from different directions, separate low-band and high-band antennas are necessary. Certain specific local conditions may dictate separate Yagi antennas for each channel to be received. In some areas, stacking of Yagi antennas may be necessary to increase gain and reduce interference. Remote preamplifiers may also be needed.

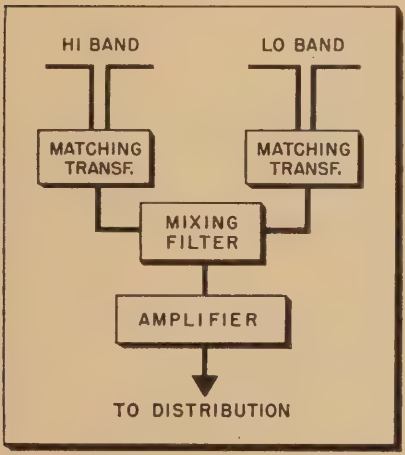


Fig. 1—Signals from high and low band VHF antennas are fed through matching network, combining filter, and then to amplifier.

Impedance Matching

Characteristic impedances of antennas vary widely with types, configurations and, in all-channel broadband structures, with frequency being received. An impedance mismatch between feed line and antenna will cause a signal transfer loss. Although a mismatch ratio of 3:1 at this point is unimportant in strong signal areas, it may pose a problem under extreme fringe conditions. A mismatch of any proportion at the input of the head-in equipment, however, can create standing waves on the feed line, resulting in ghost distortion.

Where low and high-band antennas are used, signals are fed through a band combining filter, to the input of the amplifier, as shown in Fig. 1; then to a distribution system line splitter.

When Yagi antennas are used, the signals from each are fed through a filter and into a mixing network—sometimes called the filter base. Signals injected into the filter base must be of equal strength. Where signal levels vary, attenuators at the filter input are required on stronger signals. The output of the filter base is fed through the distribution amplifier to the line splitter.

In high signal-strength areas, where direct pickup occurs on the short piece of 300 ohm wire from the antenna terminals of a set to the tuner, coaxial connections must be made directly to the tuner—being careful not to expose any of the center wire of the cable. Multipath signals, causing ghost distortion. can be picked up at this point.

Typical Installation

Illustrated in Fig. 2 is a master system designed for an existing motel with 2 floors and 20 rooms on each floor. Rooms on the top floor are serviced from an attic. On the bottom floor the exposed cable runs from room to room. By locating the amplifier in the center of the building, one output for each of the 4 risers is required. As shown, the four open riser ends must be properly terminated.

System installations require a preliminary survey using a field-strength meter to determine mast location, height and particular antenna type. Matching transformer, amplifier, coaxial cable, line splitter and set outlet requirements must also be determined. A VOM is required to check for shorts and opens in cables. Service poses no different problems than those of single set TV or FM installations. Amplifiers may require an occasional tube or component replacement.

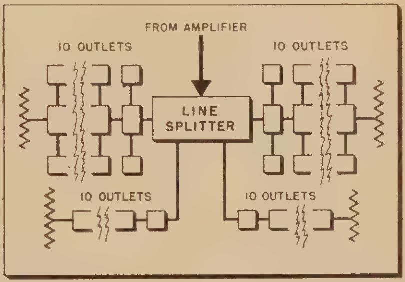


Fig. 2—Typical 40 set distribution system for use in motel or similar applications.

It is possible to design and install an infinite variety of systems to fit most needs, capable of furnishing many TV and FM receivers with optimum reception at a given location. •

—Information credit: Entron, Inc., Bladensburg, Md.

GET BEHIND THE

SYLVANIA

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America's biggest magazines deliver this business-building offer to over 100 million readers!

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Parade
Will success spoil Shirley MacLaine?
How to add $100 or more to the value of your TV set
SYLVANIA
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Reader's Digest
TV GUIDE

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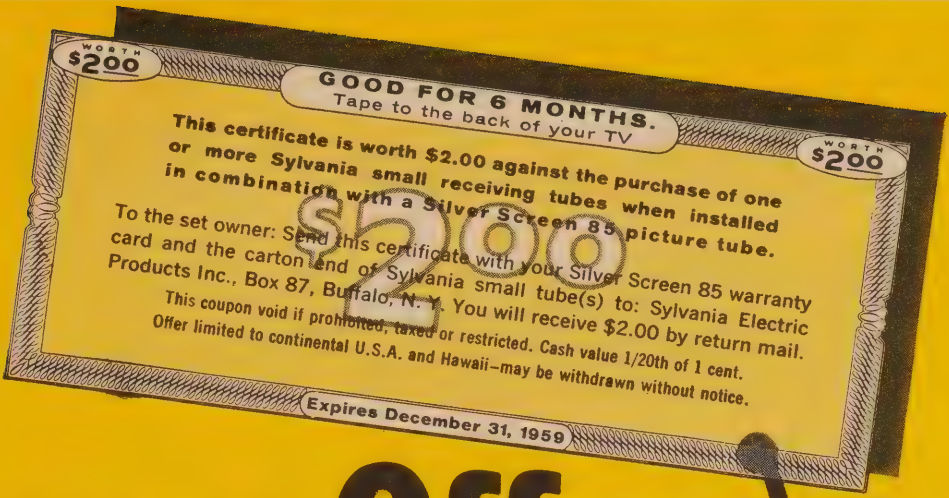
On June 20th Sylvania launched the dramatic combination coupon offer appearing in America's biggest weekly magazine, *TV Guide*, and America's biggest monthly magazine, *Reader's Digest*—plus *Sunday* and *Parade* newspaper supplement magazines.

Your Service shares the spotlight with top-quality Sylvania picture tubes and receiving tubes in a three-point program to make your customer's old TV set *better than when it was new.*

Month after month, more set owners will be saving the $2.00 coupon. Many will attach it to the back of their TV set so it's there for you to see.

You can identify yourself with this program by featuring Silver Screen 85 and Sylvania receiving tubes. Get behind the biggest, most practical, business-building offer ever made to the Service industry.



WORTH $2.00

GOOD FOR 6 MONTHS.
Tape to the back of your TV

WORTH $2.00

This certificate is worth $2.00 against the purchase of one or more Sylvania small receiving tubes when installed in combination with a Silver Screen 85 picture tube.

$2.00

To the set owner: Send this certificate with your Silver Screen 85 warranty card and the carton end of Sylvania small tube(s) to: Sylvania Electric Products Inc., Box 87, Buffalo, N. Y. You will receive $2.00 by return mail.

This coupon void if prohibited, taxed or restricted. Cash value 1/20th of 1 cent. Offer limited to continental U.S.A. and Hawaii—may be withdrawn without notice.

Expires December 31, 1959

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Sells your service and Sylvania receiving tubes in combination with every Silver Screen 85 you install

Here's an action-packed offer that can add an average of $3.00 to $6.00 in receiving tube business every time you install a Silver Screen 85 picture tube.

Sylvania urges your customers to have their receiving tubes checked to make sure they get full performance from their new Silver Screen 85. And, to emphasize the importance of replacing weak tubes, Sylvania offers to pay $2.00 toward the cost of Sylvania receiving tubes installed in combination with a Silver Screen 85.

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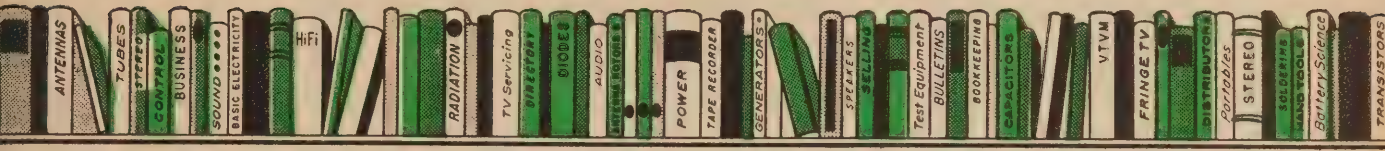

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Also See New Books on Page 100

100 ELECTRONIC CIRCUITS

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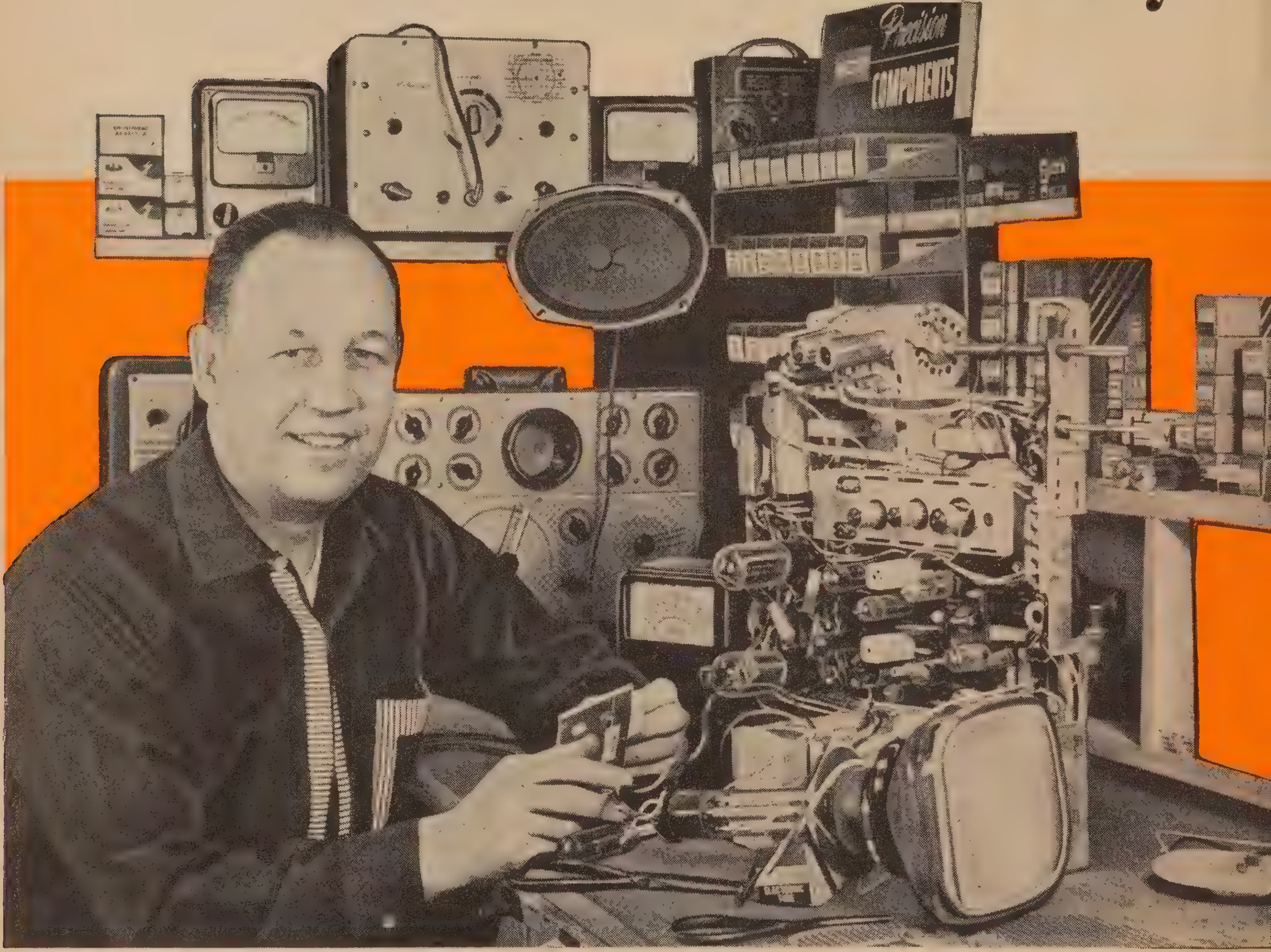
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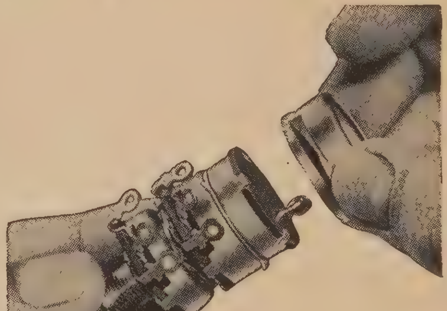

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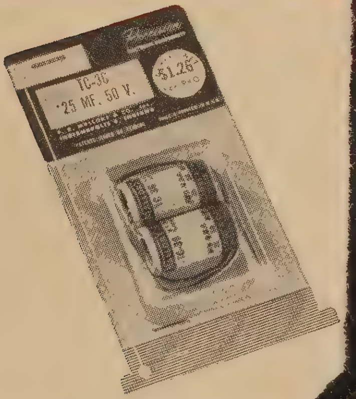

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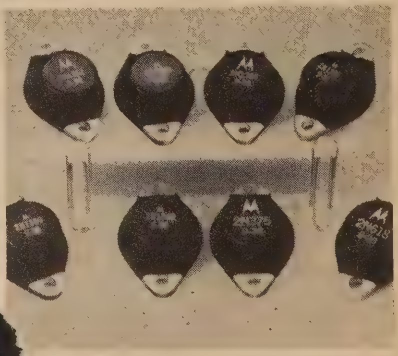

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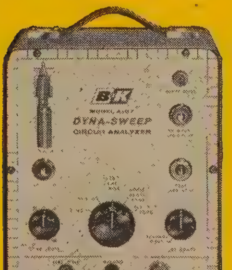

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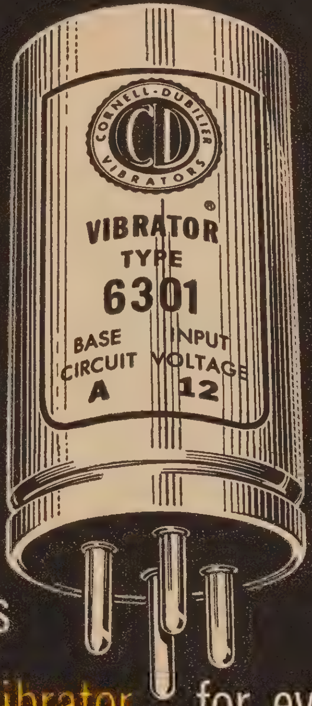

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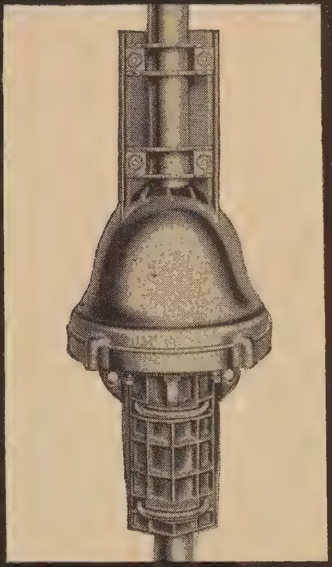

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Human Heartbeat

(*Continued from page* 45)

changed to numerical (digital) form. The resulting numbers are recorded on a second magnetic tape for computer use.

An electrocardiogram produces a series of three continuous waveforms, obtained from electrodes placed on the head, chest, and ankle of the patient. The waveforms are essentially repetitive with each heartbeat. They cannot be used in a digital computer until they have been changed from analog (continuous wave) to digital (numerical) form.

For conversion, the analog tape recording contains 10 or 12 heartbeats on three FM channel and the patient's identification on 1 voice channel. Wide-deviation FM was chosen for recording the heartbeat signals because the frequencies to be studied are between d-c and 200 cps.

A medical technician monitors the 3 signals displayed simultaneously on a scope, as shown in Fig. 2, and selects a cardiac cycle for conversion to digital form. Only one cardiac style is normally necessary for analysis, however, if a hearbeat appears erratic, the technician may record more than one cycle. The digital record is made in only a few seconds.

In the conversion process, data is sampled periodically. Each of the three waveforms is sampled 1,000 times each second, and a binary number is formed by the converter to represent the magnitude of each wave at the time of sampling. These magnitudes are recorded on digital magnetic tape to be used in a high-speed electronic computer, See Fig. 1. Approximately 1,000 cardiac cycles can be recorded in this manner on only one reel of digital magnetic tape. The data could also be printed on punched cards or plotted on paper charts.

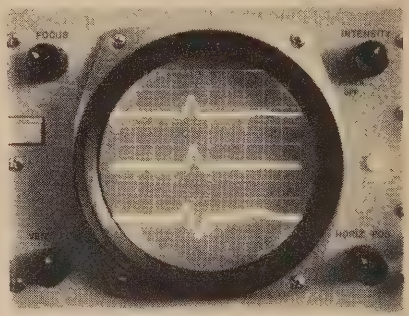

Fig. 2—A scope display of 3 simultaneous signals of the patient's heartbeat is monitored when converting to digital form.

As additional experience in digital transformation is obtained, the recording system may be expanded to include other clinical data. The use of high-speed computers for both diagnostic and statistical analysis should prove a powerful tool for the study of heart disease. •

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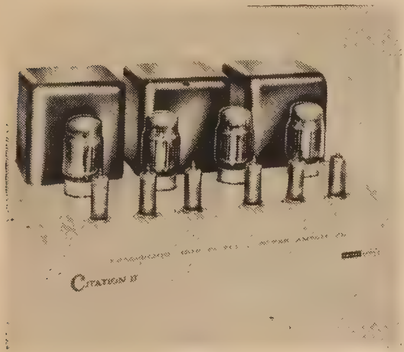

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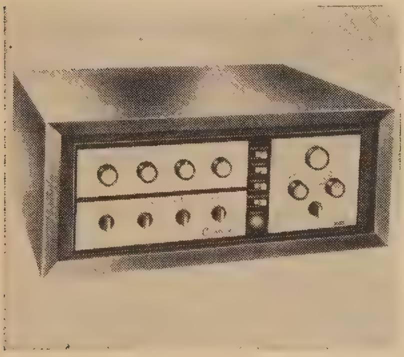

Citation I

Du Mont SCOPE CRT

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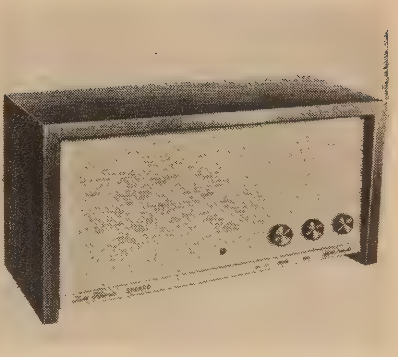

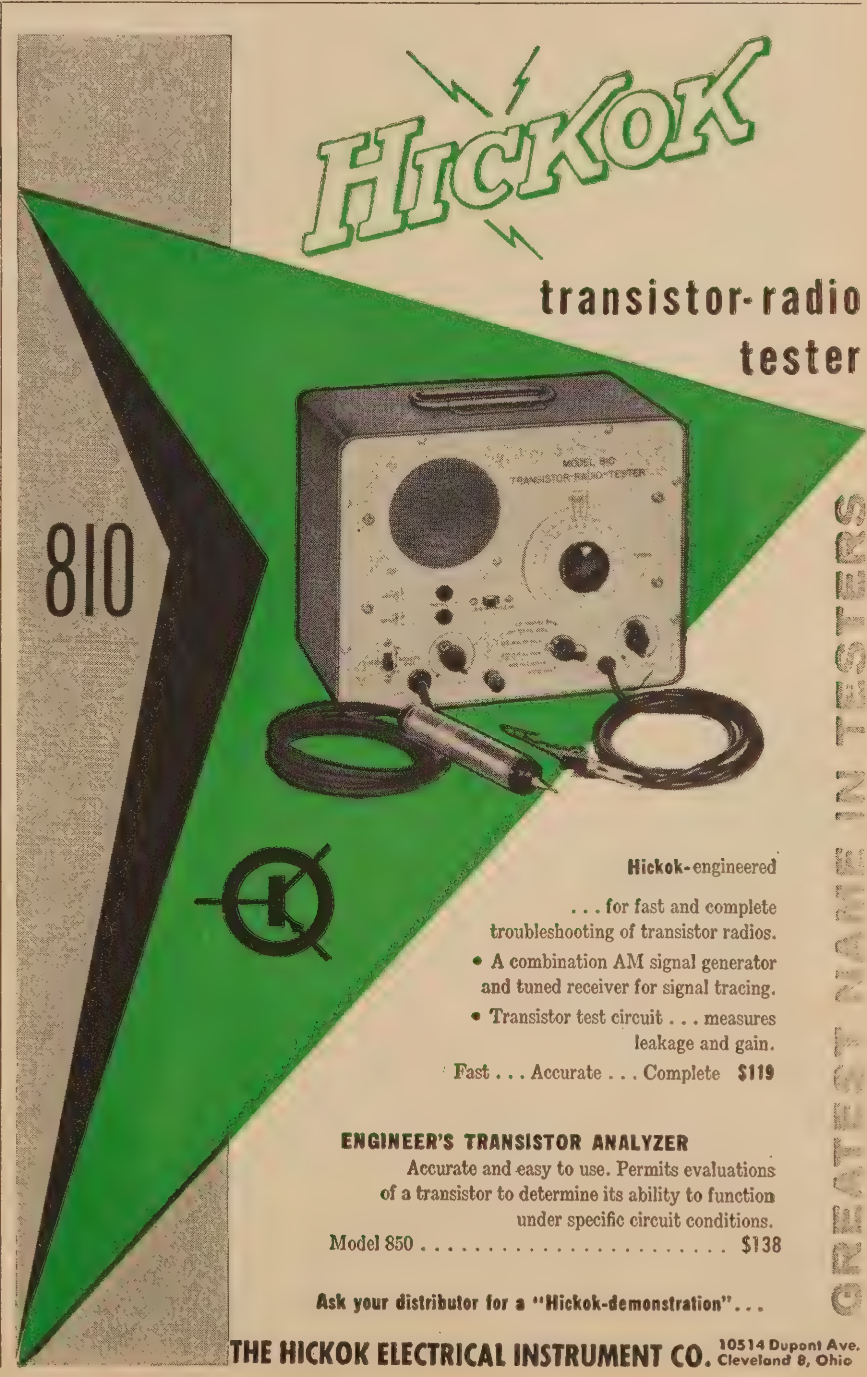

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NEW SOUNDCRAFT VINYL

SOUNDCRAFT
VINYL ELECTRICAL TAPE
R92

FOR EVERY ELECTRICAL TAPING JOB!

Here's the electrical tape that's got everything!

COMPLETE PROTECTION AGAINST INSULATION FAILURE

• Tremendous durability • Perfect conformability • High dielectric strength (10,000 volts) • Excellent adhesion and staying power • Non-combustible • Extreme resistance to aging • High resistance to temperature and humidity extremes and **remarkable adaptability to a wide variety of uses!**

REEVES SOUNDCRAFT CORP. Great Pasture Road
Danbury, Conn.

manufacturers of the world's finest magnetic recording tapes

Choosing A Mobile Radio System

(*Continued from page 44*)

antenna, power relay, fuse block, speaker, control head, and microphone should be made before beginning the installation. The driver should be able to reach the necessary controls without difficulty, and proper clearance for removal of all units should be provided.

In a trunk installation the cables are usually brought through the trunk wall, under the floor mat, and up under the dash. The speaker may be mounted on the dashboard, steering column or fire-wall. The power cables should be kept away from excessive engine heat. A good, firm ground connection is important. This should be to the battery ground if possible. Figure 2 shows two types of installations.

Antenna

Mounting the antenna often poses a problem, but a rear fender mount is generally the preferred spot, being near the trunk-mounted transmitter. Antennas may also be mounted on the rear bumper or roof. When mounted on the roof, the antenna lead is sometimes passed between the inner roof and upholstery with an electrician's "fish tape" or "snake." A good ground connection for the antenna is important. A front-mount unit has the speaker and controls built-in, and the microphone is mounted near the driver for convenience. Installations in a truck may be behind the seat, under the seat, on top of the cab, or behind the cab. In the case of an outside mounting, a waterproof case is required.

Battery

Battery charging requirements vary depending upon radio use, the equipment load, and the amount of high-speed driving. With a load of more than 50 to 60 amperes, heavy duty generators are usually required to maintain battery charge. Battery voltage should not be less than 5.8 volts for a 6 volt system and 11.6 for a 12 volt system.

Noise reduction in vehicles is usually a problem. Suppressors, anti-static powder and bypass capacitors plus bonding straps between parts of the car or truck are all methods for reducing noise. The success of many installations often depend upon solving this problem.

After The Installation

Installation is only part of the story for successful operation. The operator must be taught how to use his radio. For most installations the steps for operator adjustment are:

1. Operate the radio only with the motor running to prevent a dead battery.
2. Turn on the equipment. After a short warm-up (30 seconds) turn squelch to minimum position.
3. Adjust the volume for moderate hissing sound.
4. Adjust squelch until just beyond where the hissing sound disappears.
5. The equipment is ready to receive any message; to transmit, press the microphone button when the air is free of other messages.

Regardless of the type mobile system chosen by the technician, or the system variations devised, proper operator training provides the best start to a trouble-free and efficiently operated mobile radio system. The technician's own experience and individual equipment service-operation data will strengthen his abilities in this direction. Remembering that a useful piece of equipment is worthless unless properly operated, instructing personnel in the operation of their equipment usually becomes a mandatory phase of the mobile radio system business. •

TV REPAIR
ERNIE Brown

"It happens every time the picture flops."

Firefighting is for firemen— not servicemen

44
Joe
TUNG-SOL
TUNG-SOL
ALL NEW
GLASS

Customers really burn when they have to call you back because of a premature failure. And while you're playing fireman, the profit on your next three service calls goes up in smoke. Tung-Sol tube quality is good insurance against callbacks. They're made to the highest specs of leading radio, tv and hi-fi set manufacturers. You'll find it good policy to keep that caddy full of Tung-Sol tubes. Tung-Sol Electric Inc., Newark 4, N. J.

Tell your jobber you'd rather have

ts TUNG-SOL®

Blue Chip Quality TUBES • TRANSISTORS • DIODES

SHOP HINTS

Tips for Home and Bench Service

Transformer Repair

Slug-tuned i-f and similar type transformers used in TV and radio, require capacitors to form parallel resonant circuits. On the older types these were regular capacitors which were wired inside or outside the transformer can. On current type transformers the capacitors are formed by silver-plating both sides of a piece of mica and then sandwiching it between two plastic wafers at the base of the transformer. The sandwiching forms the necessary connections by pressure contacts.

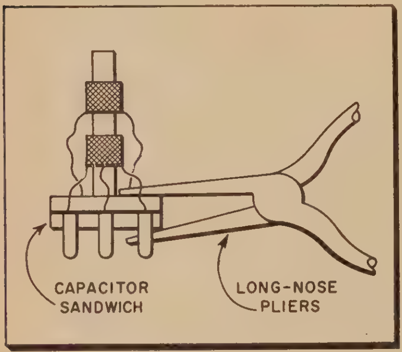

CAPACITOR
SANDWICH
LONG-NOSE
PLIERS

Fig. 1—While maintaining slight pressure on warped plastic wafers of a coil, heat is applied to correct intermittent failure.

I have found that many of these transformers, especially those used in audio detector circuits, become defective due to warping of the plastic wafers. When this warping occurs it releases the pressure contacts and produces intermittents, circuit failure after warm-up, and often complete circuit failure. This type of trouble is generally caused by mounting the transformer too close to a heat producing component, such as a power tube, high wattage resistor, or mounting the transformer directly above a hot tube on a vertical chassis. Trying to obtain exact replacements involves a considerable amount of time and using a universal replacement generally leads to complications—especially if the transformer is mounted on a printed circuit board. All these headaches are unnecessary as it is easy to repair this type of defect.

Remove the defective transformer from the chassis and then remove its aluminum shield, thus exposing the coils and capacitor sandwich. Handle the unit carefully as many of these coils are wound with very fine wire which is easily broken. Next, grip the sandwich wafers with a pair of long-nose pliers, as shown in Fig. 1 and exert a slight pressure. While applying pressure, use a clean soldering pencil to melt the two plastic wafers together near the point where the pressure is being applied. Repeat this procedure on all four edges of the sandwich. This will restore the pressure contacts. The unit is now ready to be reassembled. After the transformer is reinstalled a slight touch-up in alignment of the stage may be required.

Fusing the edges of the capacitor sandwich in this way makes future warping almost impossible at temperatures generally encountered in radio and TV receivers.—*Albert J. Krukowski, West Springfield, Mass.*

Sound Buzz

On all Olympic TV receivers bearing the designations "JE," "JJ," "HE" and "HJ," where buzz in the sound is encountered on strong signal conditions, the following changes are recommended, as shown in Fig. 2: Remove the 1K ½ watt resistor from pin 6 of the sound discriminator and replace it with a 68K ½ watt. At the same juncture add a 47K ½ watt resistor from pin 6 to ground. Remove the 18K 2 watt resistor in series with the new screen load resistor (68K) of the 6AU6 sound i-f and substitute a 22K 2 Watt.

This problem may also arise on "HE" and "HJ" chassis when the sound alignment is slightly off and the set is used under a strong signal condition.—*Olympic Radio & Television, Long Island City, N.Y.*

Short Protector

Late model RCA TV sets incorporate a resistor on the side of the tuner. If the resistor (820 ohm, 1 watt) attached to the illustrated terminal board should open, the tech-

(*Continued on page 86*)

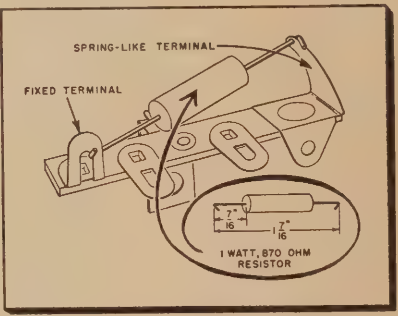
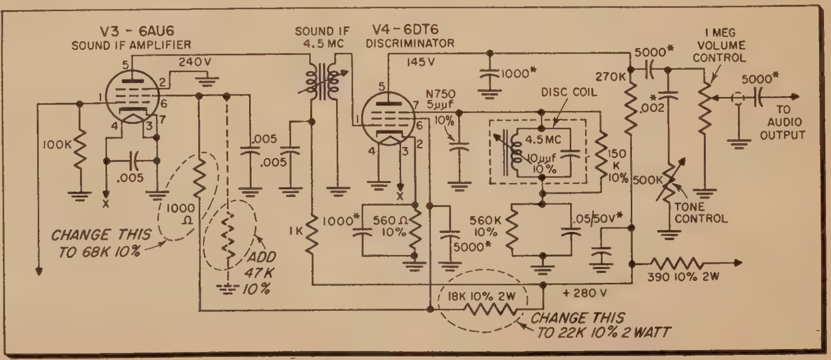

SPRING-LIKE TERMINAL
FIXED TERMINAL
7/16"
1 7/16"
1 WATT, 870 OHM RESISTOR

Fig. 3—"Grasshopper" circuit-breaker acts as a tuner B+ fuse for late RCA TV sets.

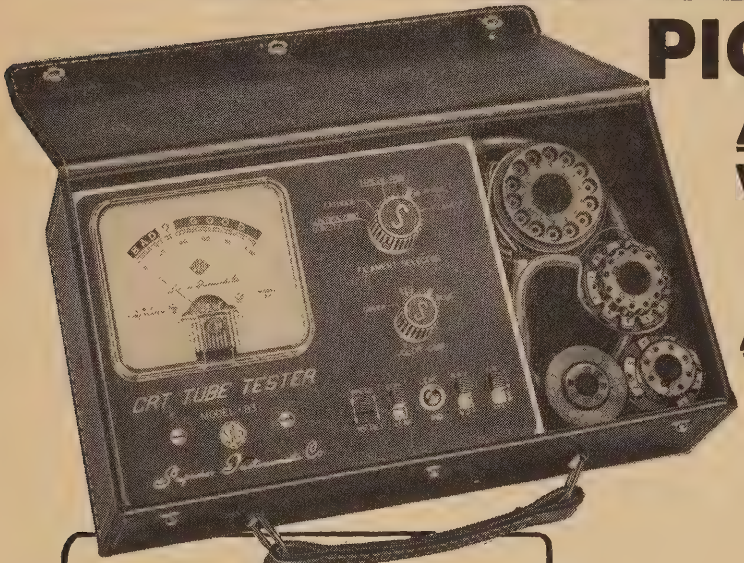
Fig. 2—Production changes to reduce or eliminate sound buzz in some Olympic TV models.


V3 - 6AU6
SOUND IF AMPLIFIER
240V
5
2
1
6
4
3
7
100K
.005
X
1000 Ω
CHANGE THIS TO 68K 10%
ADD 47K 10%
.005
.005
SOUND IF 4.5 MC
V4 - 6DT6
DISCRIMINATOR
145V
5
7
1
6
4
3
2
X
N750 5µµf 10%
1000*
DISC COIL
4.5 MC
10µµf 10%
150 K 10%
1K
1000*
560 Ω 10%
5000*
560K 10%
.05/50V*
18K 10% 2W
+ 280 V
CHANGE THIS TO 22K 10% 2 WATT
270K
5000*
.002*
1 MEG VOLUME CONTROL
5000*
TO AUDIO OUTPUT
500K
TONE CONTROL
390 10% 2W

SUPERIOR'S NEW MODEL 83

C.R.T. TESTER

Tests and Rejuvenates ALL PICTURE TUBES



ALL BLACK AND WHITE TUBES

From 50 degree to 110 degree types—from 8" to 30" types.

ALL COLOR TUBES

**Test ALL picture tubes—
in the carton—
out of the carton—in the set!**

Model 83 — C.R.T. TUBE TESTER . . . Total Price $38.50 — Terms: $8.50 after 10 day trial, then $6.00 monthly for 5 months.

The Problem:

Required, a tester—housed in a single carrying case capable of testing and rejuvenating *all* picture tubes including black and white and color; 50 degree, 90 degree or 110 degree. A tester capable of testing these ever increasing types speedily and efficiently. A tester capable of proving to the satisfaction of the set owner that the picture tube is definitely good, bad or weak. To do so the serviceman must be able to instantly switch from the comparative simple testing of a black and white tube to the complex requirements for testing each individual section in a tri-gun color tube.

The Solution:

The Model 83 more than meets the requirements specified above. It will not only test every type of picture tube ever made but will test them for leakage, emission and gas content. Furthermore even if the tube tests "good" Model 83 will help you to predict the length of time the tube will remain "good." The Model 83 will also enable you to extend the useful life of a "weak" tube by properly controlled application of rejuvenating voltage.

Specifications:

- ✓ Model 83 is *not* simply a rehashed black and white C.R.T. Tester with a color adapter added. Model 83 employs a new improved circuit designed specifically to test the older type black and white tubes, the newer type black and white tubes and all color picture tubes.
- ✓ Model 83 provides *separate* filament operating voltages for the older 6.3 types and the newer 8.4 types.
- ✓ Model 83 employs a 4" air-damped meter with quality and calibrated scales.
- ✓ Model 83 properly tests the red, green and blue sections of color tubes individually—for each section of a color tube contains its own filament, plate, grid and cathode.
- ✓ Model 83 will detect tubes which are apparently good but require rejuvenation. Such tubes will provide a picture seemingly good but lacking in proper definition, contrast and focus. To test for such malfunction, you simply press the rej. switch of Model 83. If the tube is weakening, the meter reading will indicate the condition.
- ✓ Rejuvenation of picture tubes is not simply a matter of applying a high voltage to the filament. Such voltages improperly applied can strip the cathode of the oxide coating essential for proper emission. The Model 83 applies a *selective* low voltage *uniformly* to assure increased life with no danger or cathode damage.

Model 83 comes housed in handsome portable Saddle Stitched Texon case—complete with sockets for all black and white tubes and all color tubes. Only **$38.50**

SHIPPED ON APPROVAL

NO MONEY WITH ORDER—NO C.O.D.

Try it for 10 days before you buy. If completely satisfied then send $8.50 and pay balance at rate of $6.00 per month for 5 months—**No Interest or Finance Charges Added.** If not completely satisfied, return to us, no explanation necessary.

MOSS ELECTRONIC, INC.
Dept. D-688, 3849 Tenth Ave., New York 34, N. Y.

Please rush one Model 83. If satisfactory I agree to pay $8.50 within 10 days and balance at rate of $6.00 per month. If not satisfactory, I may return for cancellation of account.

Name____________________

Address____________________

City__________ Zone____ State____

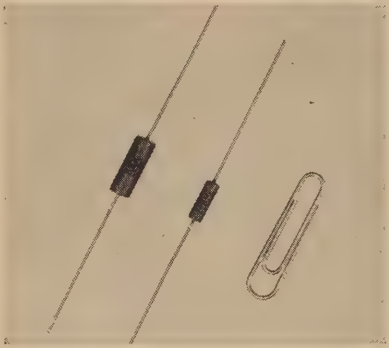
All prices net. F.O.B., N.Y.C.

New Tubes & Components

For more information, write in ELECTRONIC TECHNICIAN's new product code number on coupon, on page 56.

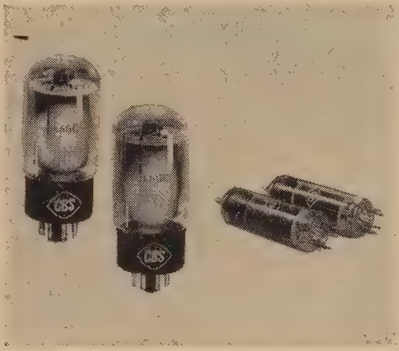
IRC RESISTORS →

By using newly developed materials and redesigning of resistor elements, the size and weight of deposited carbon resistors has been reduced by more than 50%, providing space saving in electronic equipment. Having molded insulated casings, the resistors are available in ¼, ½ and 1 watt ratings with values from 10 ohms to 25 megohms. International Resistance Co., 401 N. Broad St., Philadelphia 8, Pa. (ELECTRONIC TECHNICIAN 11-1)



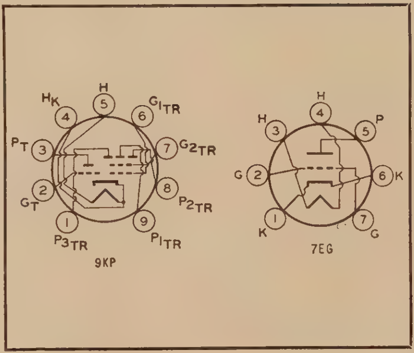
CBS MATCHED TUBES →

Two matched pairs of audio output tubes, types 7189 and 6L6GC, have been added to this line of audio tubes. Their critical audio characteristics, it is indicated, are matched to help in minimizing harmonic distortion inherent in push pull amplifiers. These tubes aid in reducing distortion below that attainable with controls, it is claimed. Other tubes in this line are the 6BQ5, 6V6GT, 5881, and 6550. CBS Electronics, Danvers, Mass. (ELECTRONIC TECHNICIAN 11-2)



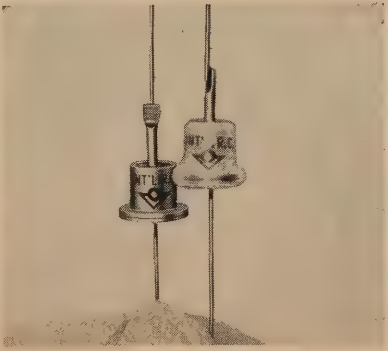
RCA TUBES →

Two medium mu tubes, the 6BN4-A and 6FH8, have been added to this line. The 6BN4-A, intended for use as an r-f amplifier, features double base-pin connections for both cathode and grid, which is said to simplify isolation of the input and output circuits. The 6FH8 is a multi-unit triode and sharp cut-off tetrode having two additional plates. The tube is for use in harmonic generator applications. Radio Corp., Harrison, N.J. (ELECTRONIC TECHNICIAN 11-3)



Int'l Rectifier DIODES →

This line of silicon pigtail diodes are now available with an insulating Teflon coating over the diode case. The jackets are said to maintain electrical and mechanical properties from —67 to +250° C, providing diode case insulation in "close-quarter" applications such as printed circuit boards, computers and data-processing equipment. Price 10¢ above diode list. Int'l Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif. (ELECTRONIC TECHNICIAN 11-4)



Raytheon TRANSISTORS

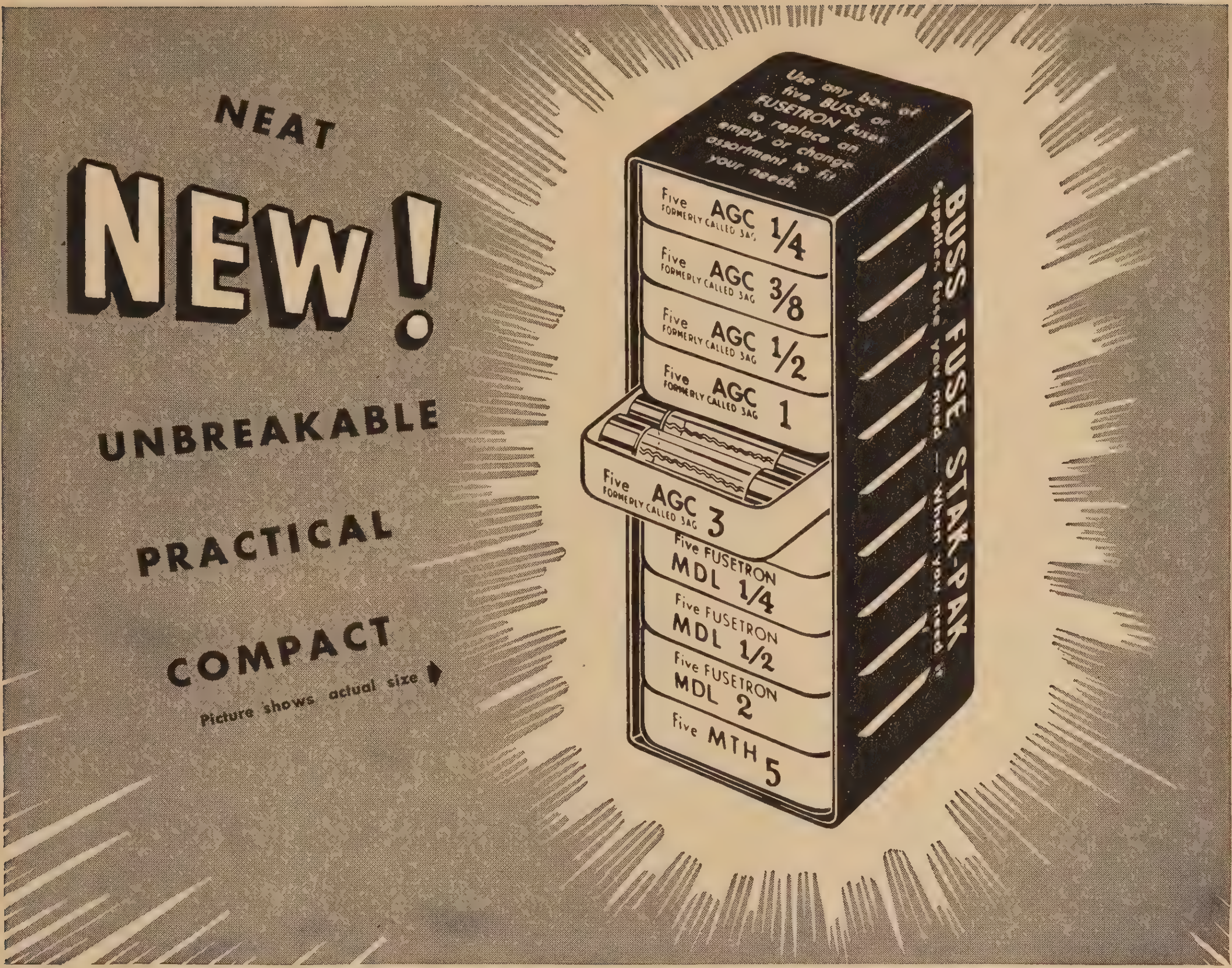
Twenty-nine devices have been added to this semiconductor line, including the 2N1386 and 1387 with freq. cut-off ratings of 60 to 50 mc respectively; the 2N1388, 1389 and 1390 are h-f and video amplifiers. The 2N438, 439 and 440 are medium current, h-f, high gain NPN germanium switching transistors. The 2N1366 and 1367 are converter and i-f transistors. The 2N1275 is a high voltage transistor with ratings up to 100 v. Semiconductor Div., Raytheon Co., Needham, Mass. (ELECTRONIC TECHNICIAN 11-5)

GE AUDIO TUBE

Filling a gap between the power ratings of the 6V6 and 6L6, the 7355 audio output tube performs in the mid-power output range. With maximum plate dissipation 18 watts per tube, a pair in push-pull AB1 without feedback, are rated at 28.5 watts with 2% harmonic distortion. In single-ended class A1 amplifiers, @ 250 plate volts, mu is 7,600 µmhos and maximum signal power output is 9.0 watts. General Electric, Receiving Tube Dept., Owensboro, Ky. (ELECTRONIC TECHNICIAN 11-6)

Corning MINIATURE CAPACITORS

With a capacitance range from 1 to 10,000 µµf at 300 v., the W-1 through W-5 glass wafer capacitors, some smaller than the head of a thumbtack, will operate at temperatures from —55 to +125 C. The units are available with leads for soldering direct or it can be connected with fine wire. The two smallest units, W-4 and W-5, are available with high temperature leads under designation WL-4 and WL-5. Corning Glass Works, Electronic Components Dept., Bradford, Pa. (ELECTRONIC TECHNICIAN 11-7)


NEAT
NEW!
UNBREAKABLE
PRACTICAL
COMPACT
Picture shows actual size
Use any box of five BUSS or FUSETRON Fuses to replace an empty or change assortment to fit your needs.
BUSS FUSE STAK-PAK
supplies fuse you need — when you need it
Five AGC FORMERLY CALLED 3AG 1/4
Five AGC FORMERLY CALLED 3AG 3/8
Five AGC FORMERLY CALLED 3AG 1/2
Five AGC FORMERLY CALLED 3AG 1
Five AGC FORMERLY CALLED 3AG 3
Five FUSETRON MDL 1/4
Five FUSETRON MDL 1/2
Five FUSETRON MDL 2
Five MTH 5

BUSS Fuse STAK-PAK

An On-the-Job Fuse Assortment Supplies the Right Fuse When You Need It

The BUSS Fuse STAK-PAK offers the service man a new, convenient way to carry fuses.

It contains fifty of the most popular fuses, in ten different sizes and types. Five fuses to a box, ten boxes in all.

It's NEAT — no loose fuses scattered about in the tool box.

It's COMPACT — the most fuses in the smallest space — takes less space than any other type of assortment.

It's UNBREAKABLE — sturdy metal — not fragile plastic.

It's PRACTICAL — to replace fuses or to change assortments just slide in tray of any BUSS or FUSETRON five-in box.

Serviceman can make assortment fit his local needs

The beauty of the STAK-PAK is that empty boxes can be replaced with same fuses — or assortment can be changed to fit the service-man's local needs.

Never any need for the serviceman to carry a lot of "slow-moving" fuses around with him.

If more fuses are needed the service-man just picks up another STAK-PAK and arranges it to suit himself.

"PICK A PAIR OF STAK-PAKS"

Two Assortments Available to Supply Practically All Service Needs.

Standard Fuse Assortment supplies fuses most in use on popular TV sets. *Order Number SP-1.*

C & N Fuse Assortment supplies the popular sizes of these fuses that are especially designed for TV. *Order Number SP-2.*

While you think of it, make a note to "*pick a pair of STAK-PAKS*" at your distributor.

FUSETRON TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION BUSS
McGRAW EDISON

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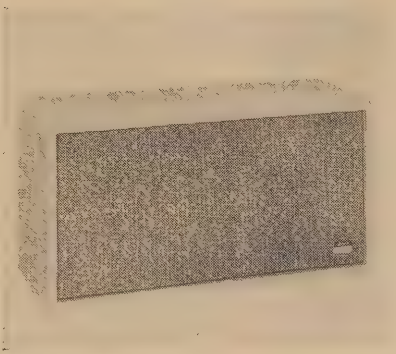
BUSSMANN MFG. DIVISION McGraw-Edison Co.
University at Jefferson, St. Louis 7, Mo.

New Audio Products

For more information, write in ELECTRONIC TECHNICIAN's new product code number on coupon, on page 56.

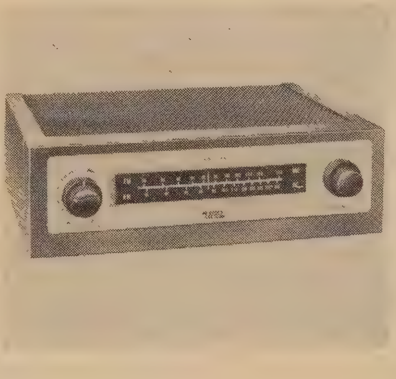
Jensen SPEAKER

Now available in unfinished form, the DUETTE 2-way book shelf speaker system cabinets are made of ¾" gum hardwood with banded edges. The system employs an 8" P8-QF woofer and P-35-VAH direct radiator tweeter. Rated at 25 watts with 16 ohm impedance, components are factory mounted. Cabinet is 12½" x 24" x 10½" and the unit response is said to be 36 to 14,000 cps. Price $59.95 net unfinished. Jensen Mfg. Co., 6601 S. Laramie Ave., Chicago 38, Ill. (ELECTRONIC TECHNICIAN 11-8)



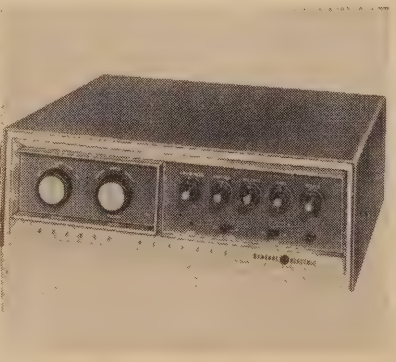
EICO FM/AM TUNER

Providing FM reception, AM reception or FM-Multiplex stereo reception, the HFT92 is not a stereo FM-AM tuner since both FM-AM reception cannot be obtained at the same time. Front end design is said to provide drift free performance. Other features include: broadband ratio detector and cathode follower. Sensitivity 1.5 v for 20 db quieting; frequency resp. 20-20,000 cps ±1 db. Kit or prefactory-wired. Kit $59.95. Wired $94.95. Electronic Instrument Co., 33-00 Northern Blvd., Long Island City 1, N. Y. (ELECTRONIC TECHNICIAN 11-9)



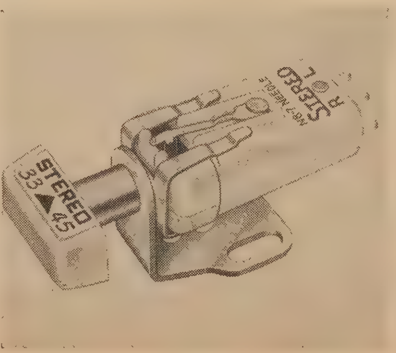
GE STEREO AMPLIFIER

Featuring dual concentric bass and treble controls, the stereophonic amplifier, G-7600, permits individual channel adjustment of bass or treble tones. Other features include friction split type controls; balance, input selector, mode selector, contour control, and rumble filter. Output 20 watts/channel. Hum and noise: 58 db r/t 10 μ v. Suggested retail price $139.95. General Electric Co., 1285 Boston Ave., Bridgeport, Conn. (ELECTRONIC TECHNICIAN 11-10)



Astatic STEREO CARTRIDGE

A high-compliance medium-output, crystal stereo cartridge, the 80 series, for general replacement and monaural-to-stereo conversions, is reported to fit standard changers and pickups. Models include 80-TS and 86-TS-TB, covering narrow record changer arms having turnover cartridge suspension and in arms having two cartridge mounting bosses spaced on ½" centers, or single hole mount from top of arm. 0.8 v. output at 1,000 cps. Astatic Corp., Conneaut, Ohio. (ELECTRONIC TECHNICIAN 11-11)

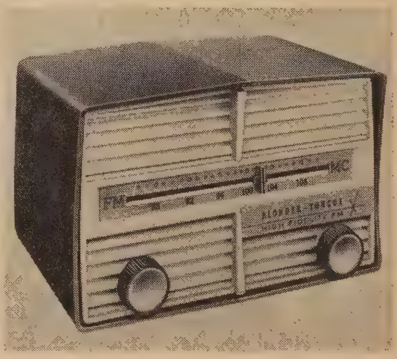


Pickering STEREO CARTRIDGE

The "Collectors Series," models 380A, 380C and 380E, are said to be hermetically sealed in mu-metal and provide four output terminals plus optional metal case ground strip to eliminate ground loops. "A" and "E" are recommended for transcription arms and "C" for auto changer tone arms with 3 to 7 gram tracking force. F/s ±2 db 20-20,000 cps. Prices: 380E $60; 380A $34.50 and 380C $29.85. Pickering & Co., Plainview, L. I., N. Y. (ELECTRONIC TECHNICIAN 11-12)

B-T FM RADIO

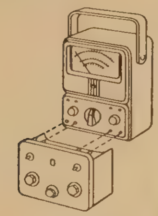
A popular priced six tube FM radio, Model R-20, featuring permeability tuner and slide rule dial, is said to be designed with drift-compensating circuitry for drift-free operation. Weighing 4½ lbs., the R-20 includes a "full circle" sound system, and is available in a number of decorator color combinations. Suggested list price $39.95. Blonder-Tongue Laboratories, Inc., 9 Alling St., Newark 2, N. J. (ELECTRONIC TECHNICIAN 11-13)



Knight TAPE RECORDER

Having pushbutton selection of record, play, rewind, forward and stop functions, the model KN-4050 dual-track tape recorder, provides a choice of two speeds—7½ and 3¾ ips. The recorder is supplied with a ceramic mike, 5" reel of tape, and is reported to have a frequency response of 50-13,000 cps at 7½ ips; wow and flutter less than 0.3%, s/n ratio 40 db. Price $99.95. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill. (ELECTRONIC TECHNICIAN 11-14)

New Simpson "Add-A-Testers"



Just plug it in

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Converts your 260* into seven different testers!

Think of it! A small investment turns your 260 VOM into a whole array of testers—equipment with a quality that is found only in individual pieces of test equipment at much higher prices. The secret lies in combining an adapter with the *top-notch meter and circuitry* of your 260.

Each combination of Add-A-Tester unit and 260 is self-contained, self-powered. Each adapter goes on and off in a jiffy. No gadgets, no complicated connections. Furthermore, Add-A-Tester units require only 1/2 to 1/3 the storage space of individual testers. By reducing bench clutter, this compactness makes jobs go faster, raises shop efficiency. Make your 260 do double duty. Stop in at your Electronics Parts Distributor or write the factory for further information.

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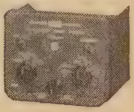
WORLD'S LARGEST MANUFACTURER OF ELECTRONIC TEST EQUIPMENT

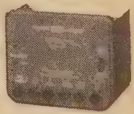
TRANSISTOR TESTER, Model 650......$26.95
Beta Ranges: 0-10, 0-50, 0-250, (F.S.)
Beta Accuracy: ±3%, with 260 ±5% nominal
Ico Range: 0-100 ua
Ico Accuracy: ±1%, with 260 ±3% (F.S.)



DC VTVM, Model 651................$32.95
Voltage Ranges: 0-.5/1.0/2.5/5.0/10/25/50/100/250/500
Accuracy: ±1%, with 260 ±3% (F.S.)
Input Impedance: greater than 10 megs all ranges

TEMPERATURE TESTER, Model 652....$38.95
Temperature Ranges: −50°F to +100°F, +100°F to +250°F
Accuracy: with 260 ±2° (nominal)
Three lead positions provided
Sensing Element: thermistor

AC AMMETER, Model 653............$18.95
Ranges: 0-0.25/1/2.5/12.5/25 amps
Accuracy: ±1%, with 260 ±3% nominal
Frequency Range: 50 cycles to 3000 cycles



AUDIO WATTMETER, Model 654......$18.95
Load Ranges: 4,8,16,600 ohms
Wattage: Continuous 25 watts (8,600 ohms)
50 watts (4,16 ohms)
Intermittent 50 watts (8,600 ohms)
100 watts (4,16 ohms)
Accuracy: ±5%, with 260 ±10% nominal
Direct reading scale from 17 microwatts to 100 watts

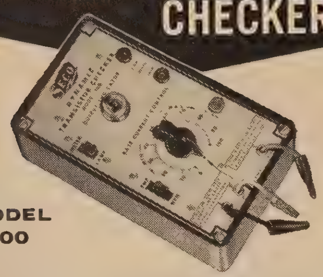
MICROVOLT ATTENUATOR, Model 655..$18.95
Ranges: 2.5 microvolts to 250,000 microvolts continuously variable in decade steps
Frequency: DC to 20 KC
Accuracy: ±1db

BATTERY TESTER, Model 656.........$19.95
Checks all radio and hearing aid batteries up to 90 volts at the manufacturer's recommended load, or any external load.

Note: All Simpson 260 Adapters provide for normal 260 usage without disconnecting the adapter.

NEW FROM SECO

DYNAMIC TRANSISTOR CHECKER



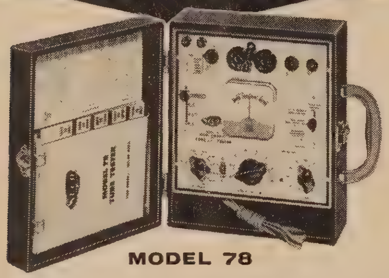
DYNAMICALLY CHECKS WIDE RANGE OF TRANSISTOR TYPES EITHER "IN OR OUT" OF CIRCUIT!

This new low-cost checker uses an entirely new approach but a proven DYNAMIC principle for checking transistors. safely tests PNP and NPN transistors either "in or out" of the circuit. Covers wide range of types: small signal including "drift" types, medium power; and power types. Provides positive check for "opens," shorts, and gain—condition indicated by means of a visual indicator plus jacks for meter or scope. Also provides GO-NO-GO test at practical currents—and permits matching of similar transistor types. No set-up required—no further leakage tests necessary. Model 100 is compact, lightweight, complete, and ready-to-use . . . helps you cash-in on the big profits in the fast growing transistorized equipment servicing field!

MODEL 100—Wired and factory tested . . . . $19.95 NET

NEW FROM SECO

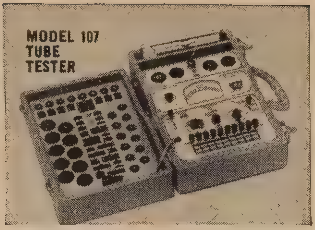
LOW COST, COMPLETE TUBE TESTER



GRID CIRCUIT and TUBE MERIT TESTER

Complete test coverage of all modern TV tube types as well as all heater type radio tubes including hybrid types, using only 5 sockets. Incorporates patented Seco GRID CIRCUIT TEST plus a reliable CATHODE EMISSION test using new low impedance low test voltage circuit—also checks filament continuity and provides open element test. One easy-to-read meter indicates results for both Grid Circuit and Tube Merit Tests. Two-stage DC amplifier isolates meter from tube under test to protect meter—and makes it possible to achieve a wide range of load currents and test conditions. Complete with portable carrying case, pin straighteners, and flip-chart for quick set-up data.

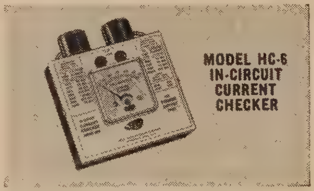
MODEL 78—Wired and factory tested . . . . $69.50 NET



outstanding reliability, accuracy

Provides 3 important tests: amplifier types tested for gain by Dynamic Mutual Conductance method—power types tested for cathode current by Cathode Emission method—all types tested for shorts and grid error by Grid Circuit Test developed and patented by Seco. Dynamic Mutual Conductance Test pre-wired to eliminate elaborate set-up. Cathode Emission Test done by free point pin-selector method—will not be obsoleted. Completely self-contained in portable carrying case.

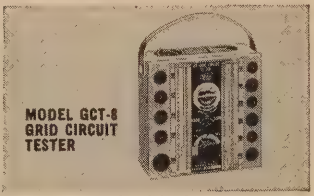
MODEL 107—Wired and factory tested $139.50 NET



positive, on-the-spot check of horizontal output current!

This new, low-cost current checker provides simple means for making a positive on-the-spot check of TV horizontal circuits. Can be placed into the circuit in seconds—*no unsoldering of circuit wiring*—immediately indicates whether horizontal tube cathode current is within manufacturer's recommended limits. Valuable as a fast, accurate indicating device when adjusting horizontal drive and linearity. Eliminates one of the most common causes of callbacks. Compact, inexpensive, easy to use

MODEL HC-6—Wired and factory tested $12.95 NET



fast check of critical "control grid" conditions

Model GCT-8 checks "control grid" condition of vacuum tubes faster, more accurately than any other tester! As many as eleven simultaneous checks—automatically! Quickly spots grid errors and leakage—stops guessing, substitution checking, and costly rechecks. Electron-Eye tube indicates faults at a glance. Truly portable. The perfect companion to any tester that employs only conventional gas and shorts test. Carry it on all calls.

MODEL GCT-8 Complete kit . . . $19.95 NET

MODEL GCT-8 Wired and tested . $29.95 NET

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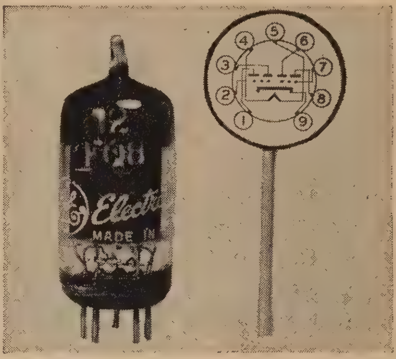
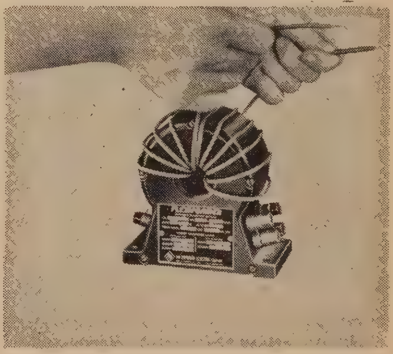
GE TUBE

The 12FQ8, labeled a "twin double-plate triode," is a unique signal-splitting twin triode receiving tube. The tube is a nine-pin miniature twin triode with each section having two plates. The extra plate in each section offers an additional output from that stage, making it possible to take two isolated outputs from one stage. It is said to cut in half the number of tubes needed in some applications. General Electric, Receiving Tube Dept., Owensboro, Ky. (ELECTRONIC TECHNICIAN 11-34)



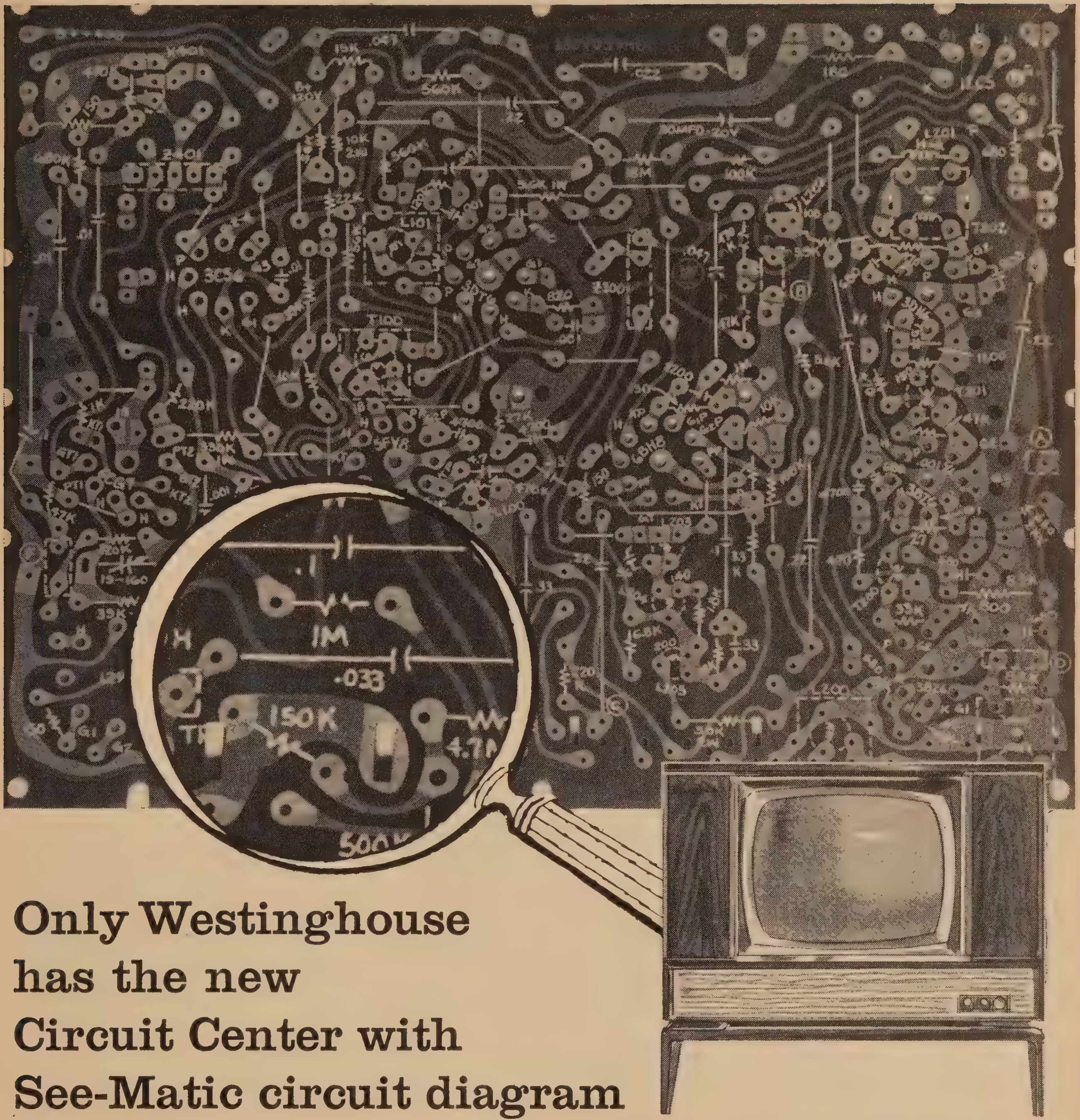
Superior TRANSFORMER

A "do-it-yourself" type unit called the Flexiformer, is a self-contained toroidal primary coil, consisting of a strip-wound silicon steel core with a coil having 400 turns of #24 B&S wire. Hand threading a number of insulated turns through the center opening gives a wide range of a-c outputs. Unit is reported to have applications in classroom, service department, laboratory and home work-shop. Superior Electric Co., 83 Laurel St., Bistol, Conn. (ELECTRONIC TECHNICIAN 11-41)



For more information, write in ELECTRONIC TECHNICIAN's new product code number on coupon, on page 56.

THE BIG IDEA...IN SERVICING



Only Westinghouse has the new Circuit Center with See-Matic circuit diagram

More than ever, Westinghouse is giving special attention to service technicians. The new Westinghouse "Circuit Center" is the industry's one new circuit board with a *complete* built-in schematic.

Now you can tell at a glance what type of component is connected from point-to-point and its value. Tube types and elements are shown...and all voltage supply lines and test points are identified.

No more "hide and seek" servicing—in many cases you don't even have to look at the manual! The See-Matic circuit diagram is printed right on the *work side* of the board...you save time, save work. It's another example of advanced engineering from Westinghouse.

For complete information about Westinghouse Tech-Lit Factory Direct Mailing Service, write to Service Department, Westinghouse Electric Corp., Metuchen, N. J., or your Westinghouse distributor.

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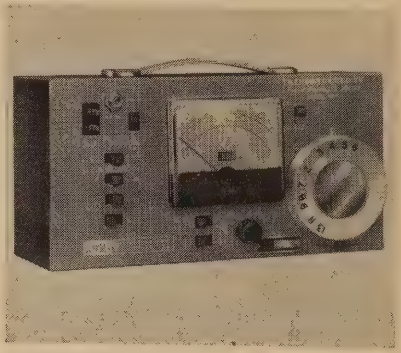
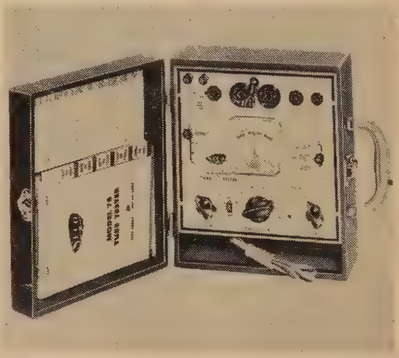
Jerrold FS METER

Designed for antenna probing, orienting and master distribution system measurements on VHF channels 2 through 13, the TMT portable transistorized field strength meter operates on four small C-cells, weighs 4½ pounds, and has ranges from 100 to 2,000,000 μv. The instrument is reported to respond only to the sync signal of the channel being observed and is immune to noise. Jerrold Electronics Corp., 15th and Lehigh Ave., Philadelphia 32, Pa. (ELECTRONIC TECHNICIAN 11-36)



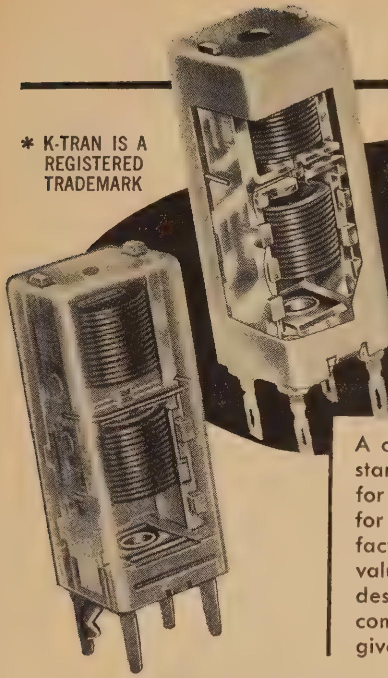
Seco TESTER

The model 78 tube tester is reported to have a patented grid circuit test arrangement; including cathode emission, heater continuity, open element test and designed with a VTVM metering principle. The portable tester has 5 sockets, is 9" x 10½" x 5", weighing less than 6 pounds, is said to provide complete tube coverage—including all modern heater type radio tubes. $69.50 net. Seco Mfg. Co., 5015 Penn. Ave. South, Minneapolis, Minn. (ELECTRONIC TECHNICIAN 11-18)



For more information, write in ELECTRONIC TECHNICIAN's new product code number on coupon, on page 56.

Miller



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A complete line of the finest I.F. transformers available anywhere at any price. Both standard and miniature sizes in all of the commonly used I.F. frequencies are stocked for immediate delivery. Conventional as well as printed circuit types are available for both vacuum tube and transistorized applications. Original equipment manufacturers will find the K-Tran the ideal choice for new equipment designs thus saving valuable engineering manhours and being assured of a top quality transformer designed by engineers with over 30 years of manufacturing experience in electronic components. The K-Tran also makes an excellent replacement transformer and will give results equal to or better than the original.

AVAILABLE IN THE FOLLOWING FREQUENCIES

Dimensions: ¾″ square x 2″ high

CAT. NO. Printed Circuit Types	CAT. NO. Regular Standard Types	FREQ.	USE
13-PH1	12-H1	262 KC	Input transformer
13-PH2	12-H2	262 KC	Output transformer
13-PH6	12-H6	262 KC	Output transformer with diode filter
13-PC1	12-C1	455 KC	Input transformer
13-PC2	12-C2	455 KC	Output transformer
13-PC6	12-C6	455 KC	Output transformer with diode filter
13-PC7	12-C7	455 KC	Input transformer for battery radios
13-PC8	12-C8	455 KC	Output transformer for battery radios
13-PC9	12-C9	455 KC	Input transformers for AC-DC radios
13-PC10	12-C10	455 KC	Output transformer for AC-DC radios
	12-C11	455 KC	IF transformer (G.E.-RTL 143 and 163)
	12-C12	455 KC	Tapped Pri. I.F. transformer
	12-C45	455 KC	Discriminator
	13-W1	1500 KC	Input and interstage transformer
	13-W2	1500 KC	Output transformer
6203-PC	6203	4.5 MC	Input or interstage transformer
6204-PC	6204	4.5 MC	Discriminator transformer
6205-PC	6205	4.5 MC	Ratio detector transformer
6206-PC		4.5 MC	Ratio Det. (GE-RTD-026)
6207-PC		4.5 MC	Ratio Det. (GE-RTD-025)
6208-PC		4.5 MC	Ratio Det. (GE-RTD-020)
1463-PC	1463	10.7 MC	Input or interstage transformer
1464-PC	1464	10.7 MC	Discriminator transformer
	1464-WB	10.7 MC	Discriminator 900 KC Peak to Peak
1465-PC	1465	10.7 MC	Ratio detector transformer
	1465-WB	10.7 MC	Ratio detector 800 KC Peak to Peak
	6260	21.25 MC	I.F. Transformer
	6261	21.25 MC	Discriminator transformer
	6262	21.25 MC	Ratio detector transformer
6230-PC	6230	44 MC	TV Converter I.F. Transformer
6231-PC	6231	44 MC	TV First I.F. Transformer
6232-PC	6232	42.5 MC	TV second I.F. Transformer
6233-PC	6233	42.5 MC	TV third I.F. Transformer
6234-PC	6234	44 MC	TV fourth I.F. Transformer

Miller
No. 2031-455
Input Trstr. I

Miniature I.F. Transformers for printed circuit transistorized applications. These miniature I.F. Transformers have tuned primary and untuned secondary windings. Proper impedance match between primary and secondary insures optimum performance.

Dimensions: ½″ square x ¾″ high

CAT. NO.	FREQ.	SPECIFICATIONS
2031	455 KC	10K Ohm pri. to 600 Ohm Sec., Input
2032	455 KC	10K Ohm pri. to 1000 Ohm Sec., Output
2041	455 KC	25K Ohm pri. to 600 Ohm Sec., Input
2042	455 KC	25K Ohm pri. to 1000 Ohm Sec., Output
2051	455 KC	100K Ohm pri. to 1000 Ohm Sec., Input

Miller
9-C2 455 K
Transistor
Output I

Sub-Miniature I.F. Transformers for printed circuit transistorized applications. To our knowledge the smallest I.F. Transformers in existence. Ferrite cup core construction permits the use of extremely small shields without adversely affecting transformer operation. A high impedance, tapped primary winding coupled to a low impedance secondary provides optimum energy transfer between stages.

Dimensions: ⅜″ square x ⅝″ high

CAT. NO.	FREQ.	SPECIFICATIONS
9-C1	455 KC	25K Ohm pri. to 600 Ohm Sec., Input
9-C2	455 KC	25K Ohm pri. to 1000 Ohm Sec., Output

Miller
10-C1 455 KC
INPUT TRAN

Also a sub-miniature I.F. Transformer for conventional circuitry using vacuum tubes. A 455 KC intermediate frequency transformer which has all the desirable features of the standard size I.F. and is smaller than a MINIATURE tube. Through the use of a ferrite cup core these sub-miniature I.F. Transformers offer the gain and bandwidth characteristics previously obtained only in larger I.F. assemblies. For AC-DC or battery radios.

Dimensions: ½″ square by 1½″ high

CAT. NO.	FREQ.	USE
10-C1	455 KC	Input transformer
10-C2	455 KC	Output transformer

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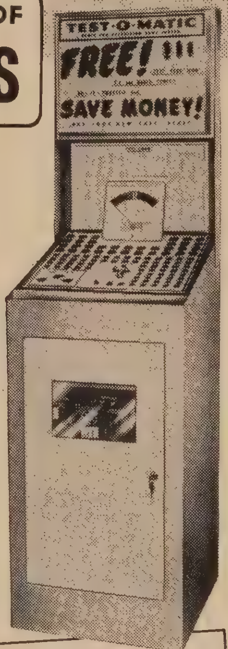
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3	1B3	1	6AK5	1	6BH6	1	6SA7	1	12B4
1	1R5	5	6AL5	1	6BJ6	1	6SK7	3	12BA6
1	1S5	1	6AM8	1	6BK7A	5	6SN7	1	12BE6
1	1T4	1	6AN8	1	6BN6	1	6SQ7	2	12BH7
1	1U4	5	6AQ5	2	6BQ6	1	6T8	1	12BQ6
1	1U5	1	6AS5	2	6BQ7A	5	6U8	1	12BY7
3	1X2A/B	1	6AT6	1	6BZ6	2	6V6	1	12CU6
1	3CB6	1	6AT8	2	6BZ7	2	6W4	1	12SA7
1	3V4	5	6AU6	1	6C4	1	6W6	1	12SK7
1	5AM8	1	6AU8	5	6CB6	1	6X4	1	12SN7
1	5AQ5	1	6AV6	1	6CD6	1	6X5	1	12SQ7
1	5J6	1	6AW8	1	6CG7	2	6X8	1	25BQ6
3	5U4G	2	6AX4	1	6CM7	1	7AU7	1	25CU6
1	5U8	3	6BA6	2	6CU6	1	12AT6	1	25L6
2	5Y3	1	6BC5	1	6DQ6	2	12AT7	2	35W4
1	6AC7M	1	6BC8	5	6J6	5	12AU7A	1	35Z5
3	6AG5	2	6BE6	1	6K6	1	12AV6	2	50C5
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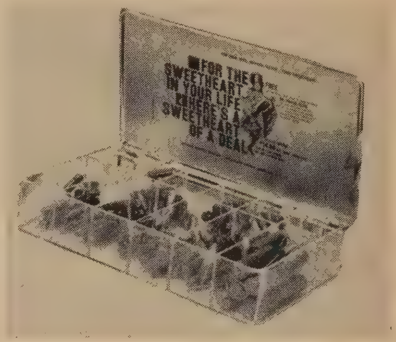
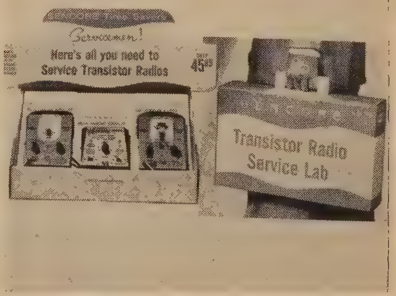

FOR THE SWEETHEART IN YOUR LIFE THERE'S A SWEETHEART OF A DEAL

Sencore TRANSISTOR LAB

A transistor radio service "lab," consisting of three basic units, is reported to provide all equipment for servicing transistor radios. It is said the TRC4 will test transistors from hearing aid to car radio output stage types; the PS103 power supply furnishes power to radios during repair and the HG104 1000 cycle generator is for signal tracing and other purposes. $45.85 net. Service Instruments Corp., 121 Official Road, Addison, Ill. (ELECTRONIC TECHNICIAN 11-19)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Telonic RF DETECTORS

XD-3 is a half-wave rectifier covering the frequency range from 1 to 1,000 mc. VSWR is 1.1:1 below 500 mc; 1.2:1 over 500 mc. Impedance is 51 ohms. With a standard polarity diode (1N21B), the d-c output is negative. This is one of a new series of crystal diode r-f detectors designed specifically for low VSWR. Telonic Industries, Inc., 1719 W. La Palma Ave., Anaheim, Calif. (ELECTRONIC TECHNICIAN 11-45)

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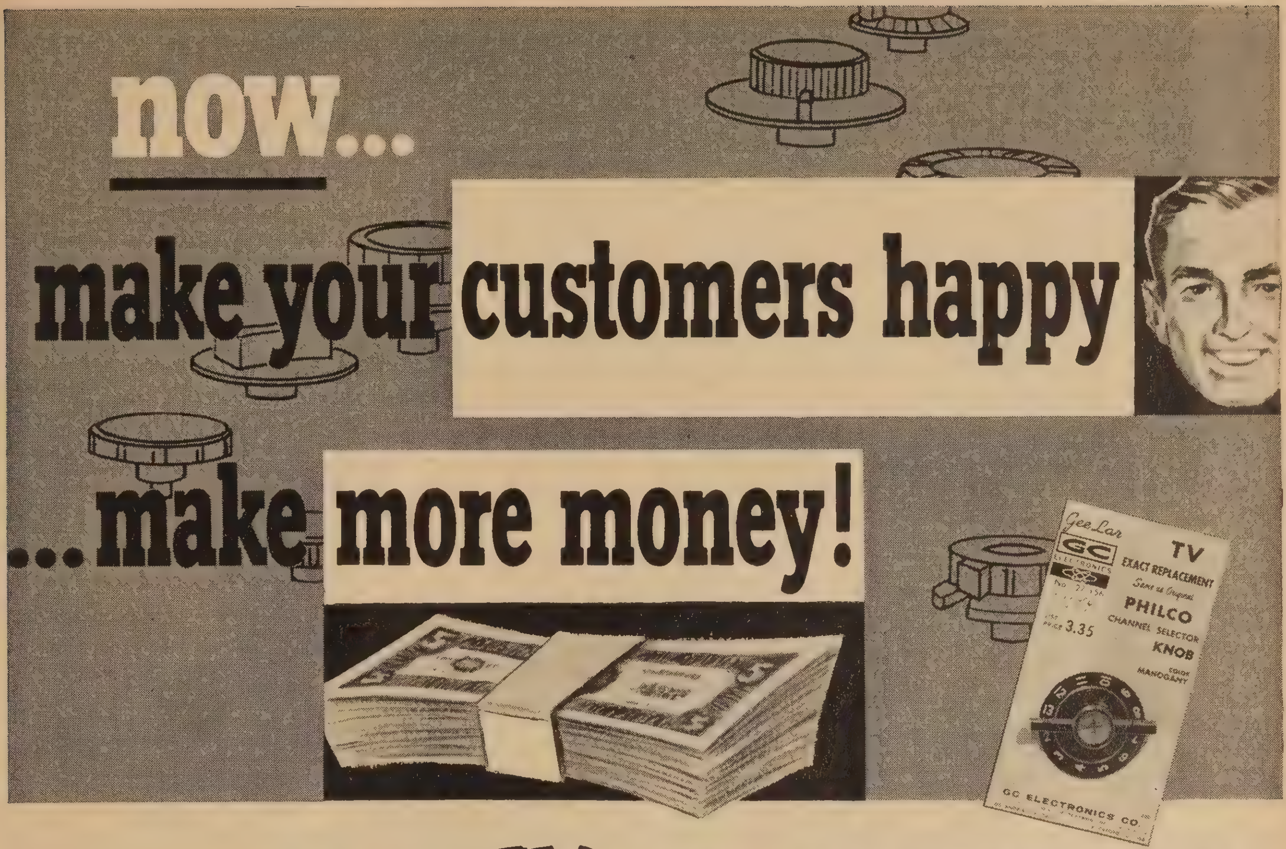
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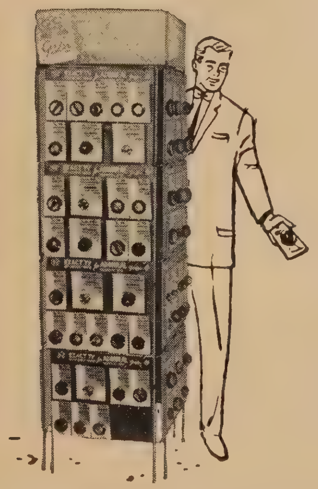

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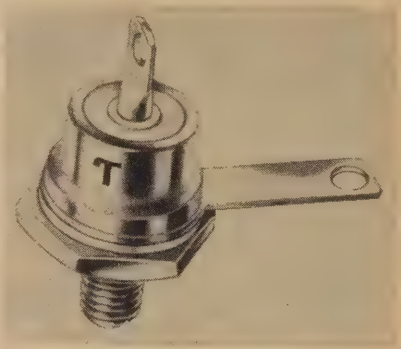
Transitron SILICON RECTIFIER

A ceramic base stud mounted silicon power rectifier, in an $^{11}/_{16}''$ configuration, is claimed to eliminate the need for insulating hardware by virtue of an alumina ceramic disc mounted between the top hat assembly and its hex base—insulating the base from rectifying junction. The ceramic base rectifiers are available in ratings up to 20 amperes @ 150° C case temperature. Transitron Electronic Corp., Wakefield, Mass. (ELECTRONIC TECHNICIAN 11-42)



Simpson ADD-A-TESTER

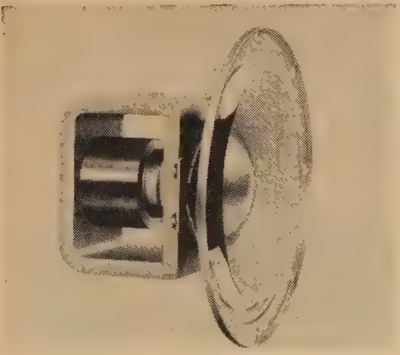
By plugging in one of seven adapters, known as Add-A-Tester adapters, it is reported any model 260 VOM can be converted into many different test instruments; including transistor tester, d-c VTVM, temperature tester, a-c ammeter, audio wattmeter, microvolt attenuator and battery tester. Said to increase versatility of all 260 VOM; the units are self-powered. Simpson Electric Co., 5200 W. Kinzie St., Chicago, Ill. (ELECTRONIC TECHNICIAN 11-20)

Reynolds SOLDERING TOOL

A long handled holder for glass-fiber brush inserts is claimed to make the soldering of aluminum simple in home, automotive, radio, TV and metal working shops. It is reported that complicated tinning and fluxing operations are eliminated when the brush is used on metal surfaces, with molten solder, removing oxide for a firm, smooth joint. In kit form with solder rods, brush refills and instructions. Reynolds Metals Co., Richmond 18, Va. (ELECTRONIC TECHNICIAN 11-40)

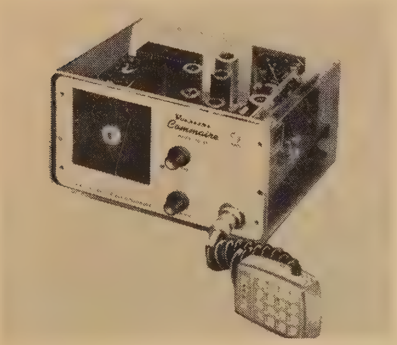
Altec TWEETER

A direct-radiator tweeter, the 2000B, is reported to have a frequency response of 1500 to 18,000 cps. By employing a gap suspension mechanical high pass filter, the tweeter is protected from low frequency signals and is said to eliminate the need for an expensive crossover network. The tweeter is rated at 14 watts and has an 8 ohm voice coil. Magnet weight is .45 lb. Altec Lansing Corp., 1515 S. Manchester Ave., Anaheim, Calif. (ELECTRONIC TECHNICIAN 11-23)



Vocaline DISPLAY

A clear plastic display case revealing the complete "Commaire" class D, Citizens Radio Communications system, characterized "Inside Story," is offered free to distributors and dealers now selling this citizens radio communications systems. It is reported the plastic case reveals the complete chassis, circuitry and parts, for the interest and information of electronics hobbyist or specialist. Vocaline Co. of America, Old Saybrook, Conn. (ELECTRONIC TECHNICIAN 11-21)



Orr RECORDING TAPE

A display assortment of 28 reels of Irish brand tape, said to include all popular sizes and types of home recording tape, is displayed on a revolving stainless steel rack using less than two feet of counter space. A "Carousel" package consists of types double play #724, long play #601, green band #211 and brown band #195, including both 7" and 8" reels. Orr Industries Inc., Opelika, Ala. (ELECTRONIC TECHNICIAN 11-27)

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- Checks for inter-element shorts and leakage.
- Checks all sections of multi-purpose tubes . . . will pick up tubes with one "Bad" section.
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- Positively cannot become obsolete as new tube types are introduced.
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- Handy tube chart contained in special back compartment.
- New tube listings furnished periodically.
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- Bears standard EIA warranty on parts and workmanship.

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TUBE TESTER

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- Checks quality (emission, shorts and gas) of over 800 tube types, covering over 99% of all TV and radio tubes in use today, including the newest series-string TV tubes, OZ4s, one volt tubes, magic eye tubes, hi-fi and foreign tubes.
- Cannot become obsolete as circuitry has been engineered to accommodate new tube types as they are introduced.
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- The most complete tube chart in the field lists over 800 tube types.
- New tube listings are furnished periodically.
- Handy tube substitution guide included with each tester to prevent lost sales due to out of stock tube types.
- Colorful window streamers supplied with each tester to attract customers.
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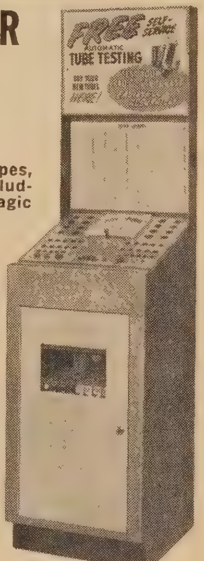
- Shipped in one carton completely assembled.
- Bears standard EIA warranty on parts and workmanship.



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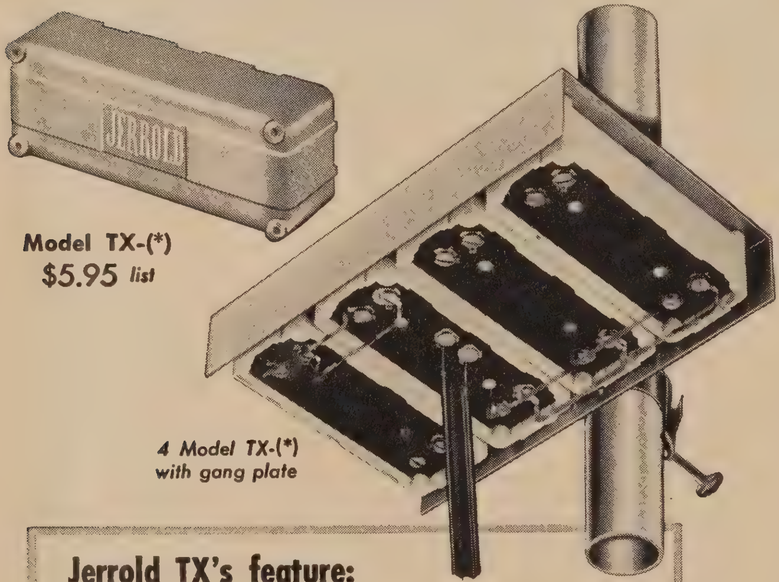
Give Multi-Channel, All-Direction Reception Simultaneously...for FM, TV, UHF and Color!

Now multi-set families can have all-direction reception at the same time on one *common line!* No more rotators or switches . . . the versatile Jerrold Model TX-(*) can be used individually or in any combination to reject unwanted channels and to bring in weaker stations bright and clear. They will mix cut-to-channel antennas with a single broad band antenna . . . separate individual channels . . . mix or separate VHF and UHF . . . and mix or separate VHF TV and FM . . . *all without loss of signal.*



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Jerrold TX's feature:
- up to 9 antennas on a single down lead
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LOOK TO JERROLD FOR AIDS TO BETTER TELEVIEWING

Printed Circuit Servicing

(*Continued from page 47*)

fication numbers painted in white. To further simplify our work, another page of the manufacturer's service data contains a diagrammatic view with a component location guide. See Fig. 3.

With all these aids available, why remove the printed boards from the cabinet? Since the vertical sweep

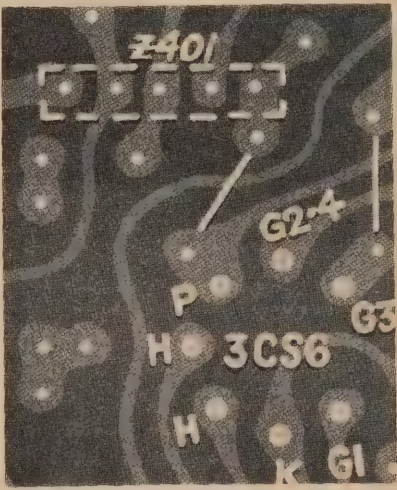
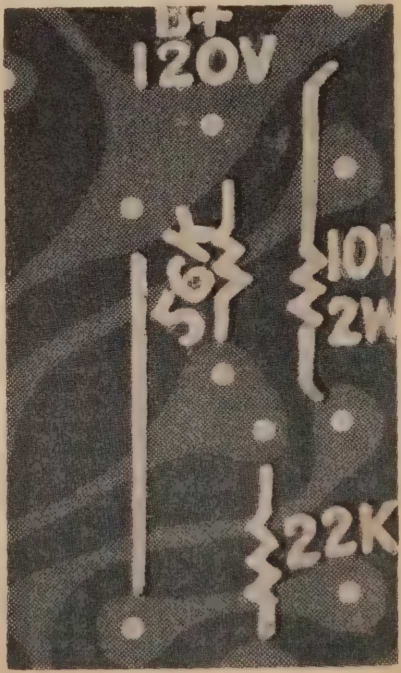


Fig. 5—Easy to check tube pins are identified by Westinghouse "See-Matic" board.

Fig. 6—Solid line at left shows easy to remove jumper for isolating B+ troubles in Westinghouse TV printed circuits.



section can be checked by the old trick of using available a-c filament voltage, we try to locate an easily accessible filament. In this instance, the service data indicates a filament test point "J" which is connected to pin 4 of the 6EA8 tube.

Applying the 60 cycle, 6.3 volt filament voltage through a 0.1 µf capacitor to the grid of the vertical output tube, 6DR7, pin 3, some vertical deflection will be apparent on the CRT if the stage is operating properly. In this case, some deflection is noted and the components in the vertical plate circuit (output transformer, yoke, etc.) may be considered good. That is, adequate enough to at least result in vertical deflection, rather than none.

Transferring the capacitor-filament probe to the oscillator grid, pin 7, no deflection is observed. Evidently, there is a defect in the oscillator portion of the circuit. Then, applying the probe to the oscillator plate, pin 6, vertical deflection is still not observed.

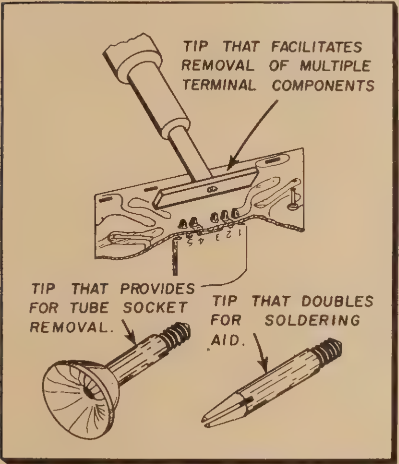

TIP THAT FACILITATES REMOVAL OF MULTIPLE TERMINAL COMPONENTS
TIP THAT PROVIDES FOR TUBE SOCKET REMOVAL.
TIP THAT DOUBLES FOR SOLDERING AID.

Fig. 7—Special soldering iron tips speed replacement of printed circuit components.

The voltage at pin 6 is approximately correct and, referring to the schematic and assembly diagram, a likely culprit seems to be the 0.1 coupling capacitor, C520. Replacing the capacitor restored the vertical deflection, although the height was slightly decreased. Adjustment of the height control remedied that; and a "shop job" was completed without removing the chassis.

In addition to RCA, many other manufacturers have included serviceability features in their latest sets. For example, GE uses a non-conductive yellow paint to indicate test points, tube types, grounds, interconnecting wires, components, etc., right on their printed wiring board. See Fig. 4.

Westinghouse provides an aid for the technician by labelling the value of components and identifying the tube pins by code letters rather than numbers. For example, Fig. 5 shows a 3CS6 tube with tube pins marked H for filaments, K for cathode, G1 for control grid, etc. Fig. 6 illustrates another Westinghouse feature, removable B+ lines, indicated by the solid line at the side of the 56K resistor. This "jumper" B+ line is not a novelty either. It serves the technician admirably when trying to locate the cause of a B+ short since the B+ line of individual branches may be removed without cutting or unsoldering.

Philco labels voltages on their printed circuit board and includes large cutouts underneath the board

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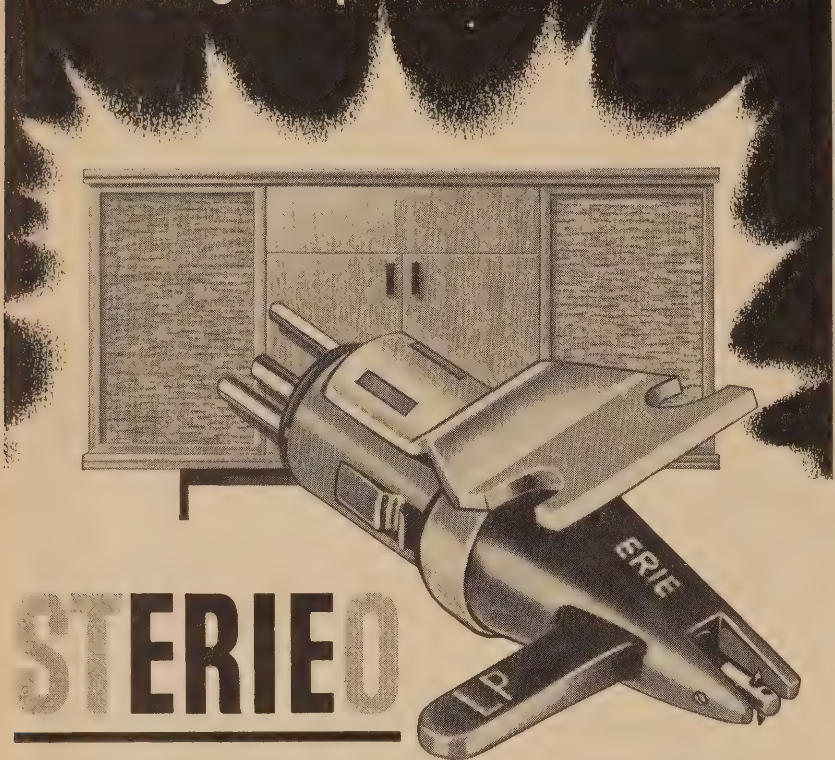

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Audio engineers specify STERIEO because it delivers the three most important stereo-qualities . . . balanced channel outputs, high channel separation, full frequency response.

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ERIE Electronics Distributor Division
ERIE RESISTOR CORPORATION
Erie, Pennsylvania

for "under-the-panel" soldering.

Motorola, aside from including a "roadmap" on the printed circuit board, incorporates almost all components on a single board in one of their latest sets. This printed circuit board can be snapped-out of the cabinet in a minimum of time [July, 1959, ET] and the technician can work on the exposed board while continuing to operate the receiver.

Sylvania includes numerous test points to aid the technician in troubleshooting.

Admiral prints voltages at each tube pin and other key points.

The aforementioned manufacturers are just a few of several that design serviceability into their sets. With all these service facilities at their fingertips in the latest TV sets (and radio, too), the technician's printed circuit service aptitude rests more on his acquiring proper tools and using the correct repair methods than ever before.

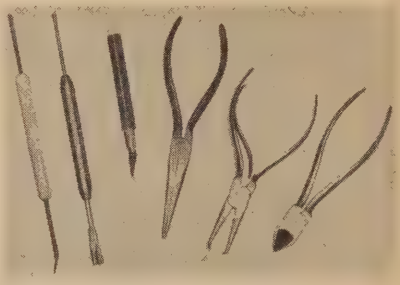
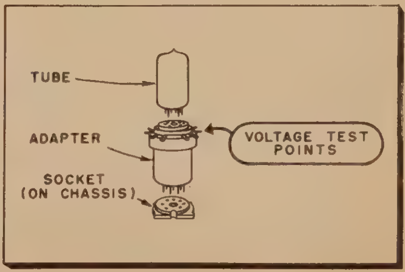


Fig. 8—Assortment of helpful tools aids in making proper printed circuit repairs.

Tools

Although many tools used to repair hand-wired sets may be similarly used for printed circuits, the technician will soon discover that a few specifically designed tools for

Fig. 9—Using adapters, tube base voltage readings can be made from top of a chassis.



printed circuits only, will be a definite asset.

The low-wattage (approximately 35 watts) soldering iron has proved particularly adaptable to printed circuit work. The relatively low power iron is suggested because many printed circuits can be damaged by excessive heat. In fact, the technician should avoid applying even this low-wattage iron to one area for an extended period of time. Frequently a higher wattage for a shorter time is preferable to low wattage for a long time.

The higher wattage solder iron or gun is needed for heavier chassis work, removal of boards from supporting lances, and unsoldering heavy tie-points. A 100 watt gun or larger may be used for this purpose.

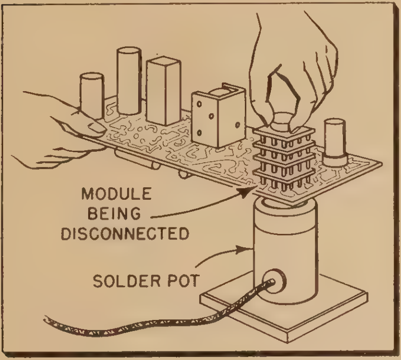
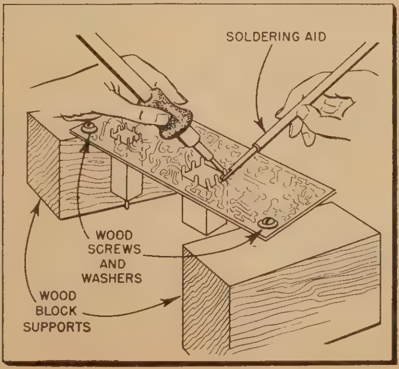


Fig. 10—Soldering pot employed to remove module or any multi-connection component.

A variety of solder iron tips are available that have screw-in threads. Fig. 7 illustrates some popular tips for unsoldering components; T-shaped, to remove packaged components; bell-shaped, to remove tube sockets; and a slot-type, to bend lugs of various components while soldering.

Fig. 11—Component damage is avoided by supporting printed board on improvised jig.



Other helpful tools are shown in Fig. 8. They include the following: Regular long-nose plier and diagonal cutters; a flush-cutting plier to allow the technician to cut leads when insufficient room is provided; a thin-blade knife to aid in separating contacts that are flat; a soldering aid to help maneuver terminals while soldering or unsoldering. Also useful, is a fairly stiff bristle brush to brush away excess solder. A good substitute for the brush is a firm-bristled toothbrush.

Since printed circuits are usually protected by a coating of wax or silicon resin, denatured alcohol is a handy fluid to dissolve the protective coating in order to do a good soldering job. A simple pencil or ink eraser is also helpful to "erase" the protective coating. Conversely, a lacquer is

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Instantly tells you whether or not it is safe to replace fuse resistors, fuses, or circuit breakers. Separate red and green scale for each commercially available fuse resistor used in radio and TV. Eliminates guesswork and wasted time. Also handy for wattage checks up to 1100 watts. DEALER NET............ 8.95

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Sylvania's Auto-radio Transistor line

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2N176
2N235
2N235A
2N235B
2N236B
2N242
2N250
2N255
2N256
2N257
2N285A
2N296
2N301
2N301A
2N307
2N307A
2N326
2N350
2N351
2N399
2N401
2N419
2N420
2N677
2N677A
2N677B
2N677C
2N678
2N678A

Problem No. 2:

The broken mica washer

More often than not the mica washer flakes when you remove the output transistor from the auto radio chassis. To save you time and money, Sylvania now packs a tight-fitting mica washer with every transistor. Next time you need an audio power transistor—get it from your Sylvania distributor and ask for Sylvania by name.

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100 Sylvan Road, Woburn, Mass.

needed to restore the protective coating once the solder job is completed. This will prevent moisture and dust from adversely affecting the circuitry. A good substance to use is silicon lacquer or "Krylon" to recoat the repaired area.

Because of this protective coating, test probes with a sharp point should be used when checking the circuit in order to insure good contact.

Other Aids

In addition to the usual complement of tools, the service technician can avail himself of various aids that will make his job easier. One of these aids, a socket adapter, will make tube pin voltages available to the technician in instances where they are not accessible. Be certain that the base of the adapter, shown in Fig. 9, is at least 1¼ inches long in order to accommodate recessed sockets. Also be sure that the socket base is not excessively big, diameter-wise, so that it could fit into a recessed socket.

While striving for more compact products, other developments have matured together with printed circuits. These developments, assisting in the miniaturization of TV and radios are package components, such as resistor-capacitor assemblies and modules. A handy piece of equipment to unsolder the numerous terminals of these assemblies is a solder pot, shown in Fig. 10. The numerous soldered connections are placed over the solder pot. As the component's soldered terminals are melted, the entire component is slowly lifted from its mounting position. To replace the component with a new one, the reverse procedure may be used.

Working on printed circuit boards out of the cabinet can be a tedious and damaging task if not done properly. The board should never be placed flat on a work bench to avoid damaging components, connections or copper foil. Instead, an improvised jig may be used, as shown in Fig. 11. This consists of two large blocks of wood, with the top surface covered with felt. Some printed boards have screw or eyelet holes near the edges and the boards can be fastened with screws in these instances. Never apply excessive pressure on any part of the board.

A low-wattage lamp (approximately 25 watt) can be placed under the board while it is resting on the jig to help the technician detect breaks in the circuit.

The neat, orderly layout of components on a printed circuit board alleviates the problem of wire mazes that confront the technician on hand-wired sets. Locating parts and circuit tracing is made easier through use of manufacturers' service data and painted circuit aids on the printed boards. Although having some disadvantages as well as advantages when compared to wired sets, the technician should not have much difficulty adjusting himself to printed circuit service. Adequate practical experience with this much used assembly is fast rendering it "just another set." ●

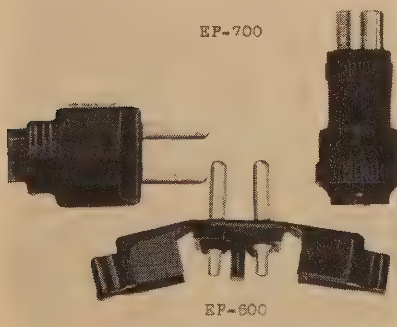
Information credit: RCA Service Co. and RCA Victor TV Division, Camden, N. J.

Bendix TRANSISTORS

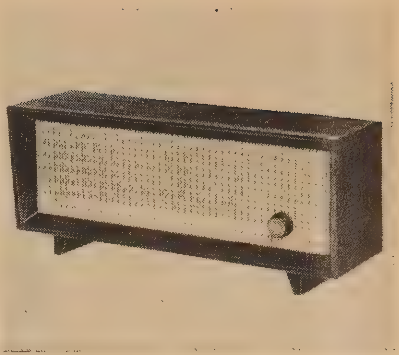
A medium power transistor designated 2N1176, A & B series, is designed for use in single-ended class B drivers, output amplifiers of portable radios, televisions, and commercial electronic units. Available in 15, 40, and 60 v. ratings, with a 300 a d-c maximum collector current rating, its linear current gain characteristic is said to permit efficient switching and low distortion output. Bendix Radio, Div., Bendix Aviation, Towson 4, Md. (ELECTRONIC TECHNICIAN 11-29)

Entron TUG-PLUG

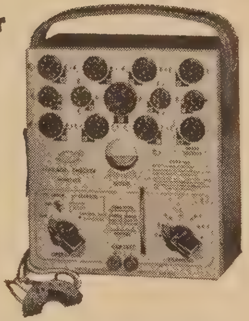
A modern line of connectors for use in master TV antenna systems, permitting plug-in connections requiring no special tools, have been developed in a variety of models. Featured on all master antenna components, the "Tug-Plug" fittings are available separately for 300 ohm twin lead and RG 59/U cable. The connectors are said to provide matched impedance at connections. Entron, Inc., P.O. Box 287, Bladensburg, Md. (ELECTRONIC TECHNICIAN 11-32)



Shield VARIABLE TWEETER



Model S-348, built-in 15 watt tweeter and variable cross-over network, is said to allow the tweeter to be balanced to suit individual taste, regardless of the woofer being used. Reported to have a flat response of 1200 to 15,000 cps. Cabinet is high-gloss piano finish, 3⅜" x 11" x 4¾" and the voice coil impedance is 8 ohms. Price $8.88 ea., or 3 for $25.50. Olson Radio Corp., 260 S. Forge St., Akron, Ohio. (ELECTRONIC TECHNICIAN 11-28)



Check TUBES, VIBRATORS
THE SENCORE WAY
FAST ACCURATE TROUBLE SHOOTING

America's Most Popular Tube Tester
more than 25,000 now in use
SENCORE LC3 LEAKAGE CHECKER
Whips those "tough dog" tube troubles . . .

Ask any serviceman who owns one . . . or try one for just one day of servicing in your shop. You'll see for yourself how much time the LC3 can save *you*. Checks for leakage between all elements, whether caused by gas, grid emission or foreign particles. Also checks leakage on all capacitors with voltage applied—including electrolytics. Provides instant filament checks in "Fil-Check" position—no need for a second filament checker. One spare pre-heating socket and new roll chart prevent obsolescence. New charts provided—no charge. Leakage sensitivity; 100 megohms, control grid to all other elements; 50,000 ohms, heater to cathode. Size, 7x6x3½". Wt., 3 lbs. For 110-120 volts, 60 cycle AC. DEALER NET 28^{95}

NOW . . . checks 172 tube types—more than any other checker of this type.

NEW . . . replaceable Roll Chart prevents obsolescence.

Check Filaments of All Receiving Tubes and Picture Tubes

FC4 FILAMENT CHECKER

For fast, easy checking of all tube filaments, without pulling chassis. Neon light goes out if tube filament is good. Also acts as continuity and voltage tester. Neon lamp glows when 115 v. AC is applied by cheater cord, providing a check on power to TV set. Size, 3⅛x4x1". With leads. DEALER NET....... 2^{95}

Check 3- and 4-Prong Vibrators . . . Faster, Easier

VB2 "VIBRA-DAPTOR"

Plugs into any tube checker; ideal for use with LC3 above. To check 6-v. vibrators, set for 6AX4 or 6SN7; for 12-v. vibrators, set for 12AX4 or 12SN7. Two No. 51 lamps indicate whether vibrator needs replacing. Instructions on front panel. Steel case. Size, 1½x1½x3" DEALER NET................ 2^{75}

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Turn page for other SENCORE Time Savers

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You can be sure the

QUAM

Adjust-a-Cone®

SPEAKER

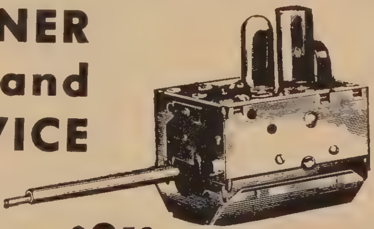
will fit . . .
it's listed in
COUNTERFACTS
and PHOTOFACTS
for your convenience

"If at first you don't succeed, try, try again" may be good advice sometimes, but it's silly when you're replacing a speaker. Instead of trying one speaker after another, just put in the right one the first time—by checking the recommendations in PHOTOFACTS or by having your distributor check the COUNTERFACTS listing for you.

These listings in COUNTERFACTS and PHOTOFACTS can save you time and effort when you're replacing a speaker. Always remember to check them first . . . and remember that this service is another QUAM exclusive. No other speaker manufacturer gives you this extra convenience . . . just as no other speaker manufacturer gives you the famous patented Adjust-a-Cone Suspension and U-shaped pot.

QUAM is your quality line... and your convenience line too.

QUAM-NICHOLS COMPANY 226 E. Marquette Road, Chicago 37, Illinois



24 HR TV TUNER REPAIR and ALIGNMENT SERVICE

VHF or UHF — *All Makes*

90 DAY WARRANTY ISSUED ON ALL TUNERS

DEALER NET PRICE
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UHF Tuners ....
UHF Converters ....
UHF-VHF Combinations $17.95

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THE ABOVE SERVICE & PRICES ARE FOR UNMUTILATED UNITS. Missing, broken & damaged parts, defective tubes charged extra at LOW net prices.

IMPORTANT: *SHIP COMPLETE. —INCLUDE ALL BROKEN PARTS. STATE MODEL & COMPLAINT. PACKAGE WELL TO AVOID TRANSIT DAMAGE.*

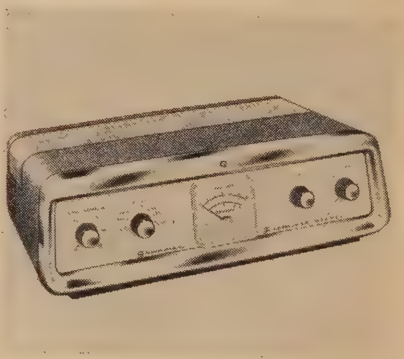
JW Electronics 2404 Bradley, Evanston, Illinois

Arkay TAPE DECK

A stereo record-playback tape deck, said to be of professional quality, features mu-metal shielded dual-track combination head at 3¾ and 7½ ips. Other features include 5 button operation, all metal tape fingers and guards, double shoe brakes, ½" capstan, automatic interlock and narrow (1.2 microns wide) gap head. Record and playback f/r 7½ ips, 30-16,000 cps. $129.95. Arkay International Inc., 88-06 Van Wyck Expressway, Jamica 18, N. Y. (ELECTRONIC TECHNICIAN 11-24)

Grommes STEREO PA

A new stereo power amplifier, model 240A, has two 20 watt channels, featuring separate level controls. A meter for checking channel balance is said to read power output and frequency response. The amplifier can be used as 40 watt monaural or as a two channel amplifier with an electronic crossover. Styled for tabletop placement in gold and white, in leatherette cases. Grommes, Precision Electronic Inc., 9101 King St., Franklin Park, Ill. (ELECTRONIC TECHNICIAN 11-25)



Short Protector

(Continued from page 66)

nician should check for a short in the r-f tube. The component is employed as a circuit-breaking device and is referred to as the "grasshopper."

When an excessive surge of current is drawn through the resistor, it will break open and part, thereby opening the B+ circuit to the tuner. If the resistor opens, the short should be located and removed before substituting the same value component. The correct dimensions of the resistor's leads and its installed position should be maintained as illustrated in Fig. 3. *RCA Service Co., Camden, N. J.*

Jerrold ANTENNA

Using inductive coupling to the a-c power line and varying the position of the receptor on the line to a point where the strongest signal is received, this 6 inch "antenna" utilizes the power line as a TV antenna. Hidden behind the set at all times, a tuning mechanism is provided on the device permitting a permanent setting for best reception on individual TV receivers. Jerrold Electronics Corp., 15th and Lehigh Ave., Philadelphia 32, Pa. (ELECTRONIC TECHNICIAN 11-17)

TV Receptor

RR DIODES

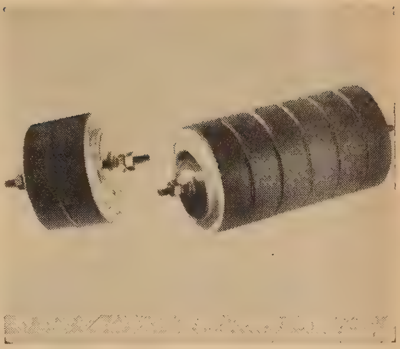
Designed for volume applications, these subminiature plastic encapsulated selenium diodes, have peak inverse voltage ranges from 50 to 400 volts at 12.5 ma, with maximum case lengths 0.380 in., and widths ranging from 0.340 to 0.480 in. Applications include computers, business machines, arc suppressors, power supplies; radio, TV, hearing aids and electric games. Radio Receptor Co., 240 Wythe Ave., Brooklyn 11, N. Y. (ELECTRONIC TECHNICIAN 11-39)

Tru-Ohm RESISTORS

Designated the S.AL series, with axial leads, silicone coating and all welded construction, this line of precision wire wound resistors is said to meet rigid military requirements, provide maximum power in minimum space and be impervious to moisture. Standard sizes are one, two, three, five, seven, ten, fifteen and twenty watts. Ranges from 1 to 90k ohms. Tru-Ohm Products, 2800 N. Milwaukee Ave., Chicago 18, Ill. (ELECTRONIC TECHNICIAN 11-43)

GE VARISTORS

Additional medium voltage Thyrite varistor assemblies, engineered for 1 to 10 kv systems, are now available from a line suited for components from 6 to 10,000 volts. Thyrite, a non-linear material, is said to respond quickly to surge voltage decays, minimizing current drain and power consumption. Medium voltage units are suited for protection of chokes, reactors, d-c motor fields, and transformers. General Electric Co., Magnetic Material Section, Edmore, Mich. (ELECTRONIC TECHNICIAN 11-35)



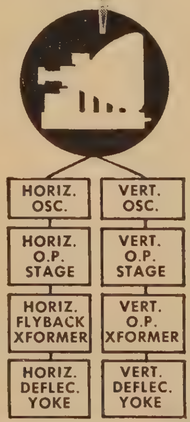
Pinpoint in Seconds...

HORIZONTAL & VERTICAL SWEEP TROUBLES

NEW
SENCORE
Time Saver
Sweep Circuit Trouble Shooter
MODEL SS105
PROVIDES
DEFLECTION YOKE SUB
HORIZ OUTPUT CATH
OSCILLATOR
OSC OUTPUT

The missing link in TV service . . .

SENCORE SS105 SWEEP CIRCUIT TROUBLE SHOOTER



IT'S A . . .

UNIVERSAL HORIZONTAL OSCILLATOR. For direct substitution. No wires to disconnect in most cases. Traces trouble right down to the defective component. Variable output from 0-200 volts, peak-to-peak.

HORIZONTAL OUTPUT CATHODE CURRENT CHECKER. A proven method that quickly checks the condition of the horizontal output tube and associated components. Adaptor socket prevents breaking wires. Easily replaceable Roll Chart gives all necessary pin, current and voltage data.

UNIVERSAL DEFLECTION YOKE. A new, simple way to determine yoke failure accurately—without removing yoke from picture tube. Merely disconnect one yoke lead and substitute. If high voltage (also bright vertical line) is restored, TV yoke is defective.

DYNAMIC FLYBACK TRANSFORMER CHECKER. Merely flip switch to "Flyback Check" and meter will indicate condition of flyback transformer, in degrees of horizontal deflection. Extremely sensitive and accurate; even shows up one shorted turn on flyback.

VOLTMETER. For testing bootstrap, screen and other voltages. Direct-reading voltmeter, 0-1000 volts.

UNIVERSAL VERTICAL OSCILLATOR. Checks oscillator, output transformer and yoke. Merely touch lead to component and check picture on screen.

Size, 7x6x3½". Wt. 4 lbs.
For 110-120 volts, 60 cycle AC.

DEALER NET 39^50

See Your Parts Distributor NOW!

SENCORE
ADDISON 2, ILLINOIS

Audio NEWS LETTER

HARMAN-KARDON reports record sales of $3,800,285 (up 15%) and $150,124 income (up 130%) for fiscal year ending June 30, 1959.

WESTINGHOUSE has developed a stereo demonstration unit and record, available to dealers to dramatize stereo effect to the public.

RCA announces two tape cartridge player-recorders: monophonic CP-1 and stereo SCP-3. Latter retails for $350, features automatic tape reverse.

ASTATIC is staging a contest in search of the oldest D-104 mike. Closing is Dec. 1st. First prize is a silver D-104, plus standard D-104, 10-C or 10-D.

ERA changes rep convention dates to Feb. 11-13 at Chicago's Drake Hotel.

JAMES B. LANSING names reps: Dave Champlin, Seattle; J. Malcolm Flora, Detroit. Company also publishes 24-page pocket catalog of entire line.

ORR INDUSTRIES names Cecil Stowe manager of the new Customer Relations section. Also Charles H. Donahue, Jr., ex-GRAY MFG., as ad manager.

CROSBY unveils the Series 440 Madison Fielding stereo receiver @ $325. Ratings are 2 µv for 20 db FM quieting, 25 watts/channel music power, phono hum −60 db.

JENSEN MFG. introduces the TR-10U Tri-Ette 3-way bookshelf speaker system @ $89.50 unfinished. Response is rated at 25-15,000 cps, 30 watts.

OXFORD ELECTRIC reports sales of $4,672,278 and pretax income of $124,519 for the first 6 months of 1959. Same 1958 period was $3,190,537 and $76,792.

"STANDARD METHODS OF MEASUREMENT FOR AMPLIFIERS" has been published by IHFM. The booklet, as well as the earlier one on tuners, is available for $1.

GENERAL ELECTRIC announces a 10-day home trial plan for its VR-22 stereo cartridge. GE also introduces the 7355 audio tube for amplifiers in the 20-30 watt range. It is said to fill the gap between the 6V6 and 6L6.

GARRARD lost no time in publishing a piece which put the CU report in better perspective. Copies reached dealers almost at the same time CU hit the news stands. Dealers need every support they can get, Mr. Manufacturer.

REK-O-KUT registers offering of 214,000 shares of common stock @ $3.50, 2/3 for company account, 1/3 for stockholder account. The company also announced a Tropical Holiday contest for dealers based on points for purchases or sales increases during the Sept. 1, 1959 to April 30, 1960 period.

Choose . . . XCELITE® Hand Tools . . . the Professionals do!
You need the BEST TOOLS to do the BEST JOB . .

Your Radio, TV and Electronic Parts Distributor has them!

Check the "SEIZER"
Provides the necessary "third hand" in so many tricky situations!
No. 42H
- Clamps on as a Heat Sink.
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- Holds dial cords when stringing them.
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- Out-reaches and out-holds needle nose pliers.

Select from the Complete Line of Quality Tools and Handy Kits . .

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PREFERRED BY THE EXPERTS

SPEAKERS for SOUND INSTALLATION

Regardless of your application . . . P.A., Inter-com, outdoor, extended range . . . OXFORD is the SPEAKER for you. Our very complete line includes speakers that will meet your every need . . . quality . . . delivery. Write for our new catalog today.

Leading distributors carry OXFORD.

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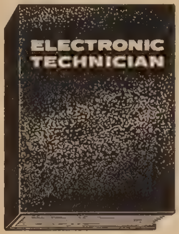
In Canada: Atlas Radio, Toronto

OXFORD BRANDS: Supreme Transformers, Hudson Lamps, Tempo Hi-Fi, Oxford Speakers & Rear Deck Kits.

BINDERS FOR YOUR ELECTRONIC TECHNICIAN



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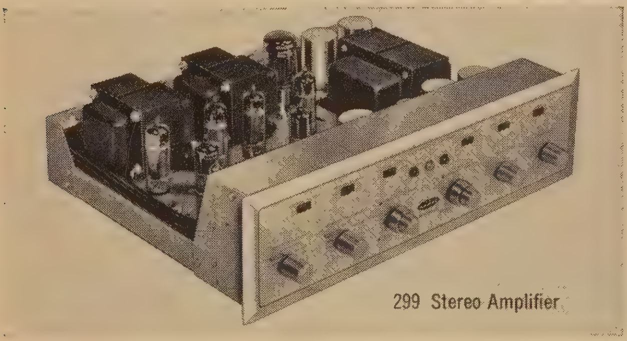
299 Stereo Amplifier

Here's Why You, Too, Should Recommend H. H. Scott Stereo Hi Fi Components

A recent survey showed that electronic technicians recommended H. H. Scott most often. The reason: H. H. Scott components have advanced features and circuit designs found nowhere else. The highest quality electronics parts are used to give years of trouble-free operation. Spacious chassis layout simplifies servicing when required. That's why when you recommend H. H. Scott, you can do so with confidence.

H. H. SCOTT

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FREE—Rush me your free catalog and hi-fi guide containing complete technical information on H. H. Scott components.
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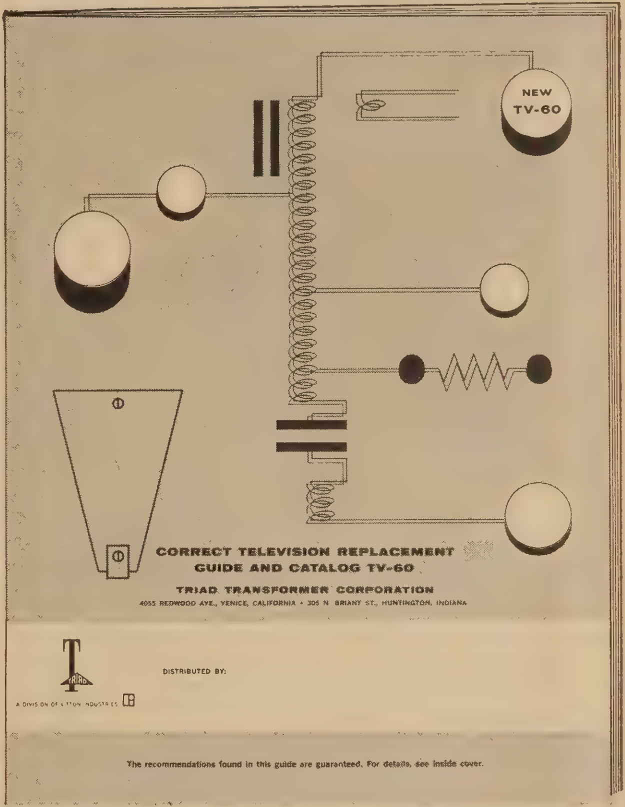

CORRECT TELEVISION REPLACEMENT GUIDE AND CATALOG TV-60

TRIAD TRANSFORMER CORPORATION

4055 REDWOOD AVE., VENICE, CALIFORNIA • 305 N. BRIANT ST., HUNTINGTON, INDIANA

DISTRIBUTED BY:

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The recommendations found in this guide are guaranteed. For details, see inside cover.

NEW TV-60 CATALOG AND CORRECT REPLACEMENT GUIDE FOR 1960

Behind this cover you'll find 132 pages of completely revised guaranteed recommendations of over 180 new items, including 50 new flybacks, 16 new yokes, new powers, chokes, width, linearity coils and modification kits, and whole new sections of recommendations never before covered.

Ask your TRIAD distributor for the new TV-60, or write direct to TRIAD.

Remember, old information will cost you time and money!

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the modern approach to

HI-FI STEREO

servicing

AUDIO SYSTEM ANALYZER "800"

Here is a Complete Audio Laboratory of six instruments in one package! Our engineers have designed the "800" to save your *time* and to simplify the operational procedure of your shop. We know your time is your most valuable inventory. Look at the individual services the "800" performs at a fraction of the cost for all six instruments! . . . $169.95.

- it's an AUDIO VTVM
- it's an AUDIO OUTPUT WATT METER
- it's an AUDIO-SIGNAL GENERATOR
- it's an INTERMODULATION DISTORTION METER
- it's a HARMONIC DISTORTION METER
- it's a DB and NOISE METER

and it's EASY to use

WINSTON ELECTRONICS

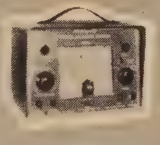
offers a complete line of test equipment

SEE YOUR LOCAL PARTS DISTRIBUTOR TODAY

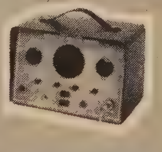
LITERATURE AVAILABLE ON REQUEST

Dynamic sweep Circuit Analyzer . . . for color and black and white TV. Trouble shoot horizontal and vertical sweep circuits by signal substitution. This same instrument also is a complete compatible flyback and yoke tester! . . . $69.95.

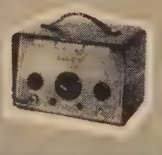
Dynamic AGC Circuit Analyzer . . . AGC trouble shooting made painless! The "825" solves complex AGC problems fast because it combines AGC test signal, AGC circuit monitor, AGC pulse indicator, Bias clamp and supply, Continuity tester and VTVM . . . $79.95.



Intermittent Condition Analyzer . . . the fast way to locate intermittents and "borderline" components. Gives modulated test signal for TV or RADIO. "Electro-Wand" pickup loop checks tubes for noise and intermittents. "Electro-Probe" locates faulty components and loose connections without direct circuit connection . . . $89.95.



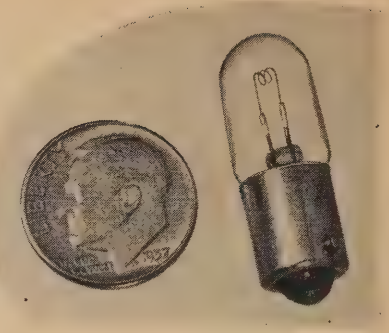
Induced Waveform Analyzer . . . adapts *any* "scope" to check waveforms from the top of the chassis. "Phantom-Probe" makes every tube a test-point without direct connection. Localizes trouble in minutes. Works on TV Channels 2 thru 13, 3.58-4.5 mc IF, 21 mc IF, 40 mc IF, Audio, Video, and Radio frequencies . . . $169.95.

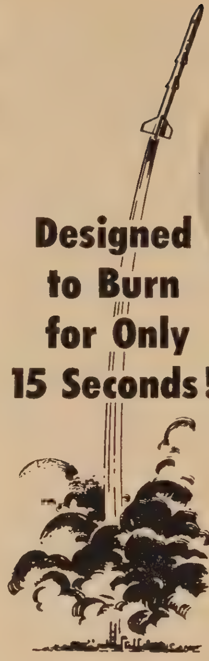


WINSTON ELECTRONICS

DIVISION OF Vetronic INDUSTRIES, INC.

4000 N. W. 28th STREET • MIAMI, FLORIDA





Designed to Burn for Only 15 Seconds!

This miniature lamp has a planned life of only a quarter of a minute, but its brief existence is truly spectacular! For in those few seconds it pours forth all the light normally emitted during the entire lifetime of an ordinary lamp!

Designed to provide a point of intense light for the tracking apparatus that determines the accuracy of a missile's course in the first few seconds of flight, this lamp is typical of many specially engineered lamps Chicago Miniature is called upon to produce.

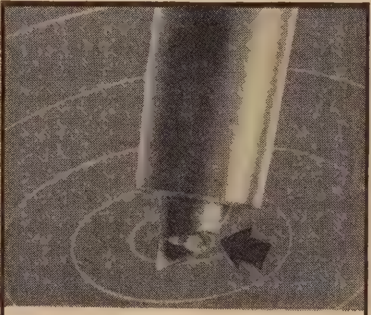
Be assured that the Chicago Miniature Lamps your jobber offers will burn longer than 15 seconds! The same experienced, precision engineering that designed and produced this special lamp is producing long lasting, standard miniature lamps for your use.

Always ask for Chicago Miniature Lamps!

CHICAGO MINIATURE LAMP WORKS

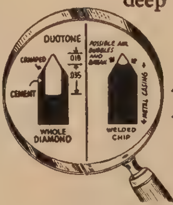
1516 No. Ogden Ave., Chicago 10, Ill.

Miniature Lamps for every requirement



FROM ONE WHO LEARNED

This enlargement shows a diamond-chip needle sent us by a disappointed user, who learned all diamond needles are not O.K. Shows what happens if a heat bubble forms when a chip is welded on. Can't happen with a Duotone Needle that uses only the *whole* diamond set deep in the metal shank.



Insist on Duotone. Be sure. Duotone's whole diamond can't break off.

DUOTONE DIAMOND NEEDLE

"that remembers"

Keyport, N. J.

In Canada: Chas. W. Pointon, Ltd., Toronto

Service Score

(Continued from page 48)

customer declining while another company's service technician repairs the set quickly in the home.

9. *Are your service technicians instructed never to discuss competitors or their activities with their customers?*

It's foolish to "build up" a competitor's reputation and equally foolish to malign him. The latter only sounds like "sour grapes." Therefore, you can't win when you talk about competitors.

10. *Is an adequate stock of replacement parts maintained?*

It costs a relatively small amount of money to stock an adequate supply of most parts. This enables the technician to offer faster service. Rushing to the distributor for every little part consumes a considerable portion of the technician's productive time.

11. *Do you have complete insurance coverage?*

Fire, theft and liability insurance should be carried by every reputable business to protect its customers and itself. The cost of insurance is relatively insignificant when compared to the protection it offers, and an established service shop cannot afford to be without it. A single major mishap can bankrupt a shop.

12. *Do you ever make necessary repairs beyond that which the customer anticipates?*

Few customers view this practice in its true perspective. The shop that completes costly additional work without first obtaining the customer's acceptance may be viewed with suspicion. Even though legitimate, the repair bill may be challenged.

13. *Do you keep complete service records of all customers?*

Accurate record keeping may seem to be both a bother and an expense. However, keeping records up-to-date will enable a shop to easily check a previous service job for warranty verification, and aid when compiling a mailing list for seasonal specials, checkup reminders, etc.

14. *Before a unit brought to the shop is returned to the customer, do you carefully inspect for cleanliness?*

A set returned with dust and grime indicates to many customers that the repair was accomplished in a slovenly manner. Do not allow a simple cleaning to reflect on your technical ability. Your customer never sees the dust on his chassis until you return it from the shop.

15. *Are your service charges maintained at an honest, yet profitable level?*

Service charges by individual shops should be standardized to allow a fair business profit. There is no sense in being in business unless it is at a profitable level. Also, basic charges should be standardized to avoid conflicting estimates of two technicians from the same shop over a short period of time. And don't forget—neighbors compare prices.

16. *Are service calls answered in the order of call-in within the limitations of each technician's route?*

You'd be surprised how many neighbors know each other. A customer will be insulted if he discovers that he was shunted aside for an-

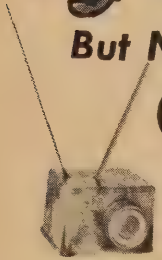
(Continued on following page)

Typical Indoor Antenna Gripe

I'm afraid to let go-or
THE PICTURE FADES-!!

But Not With-

Channel King®
Indoor Antenna

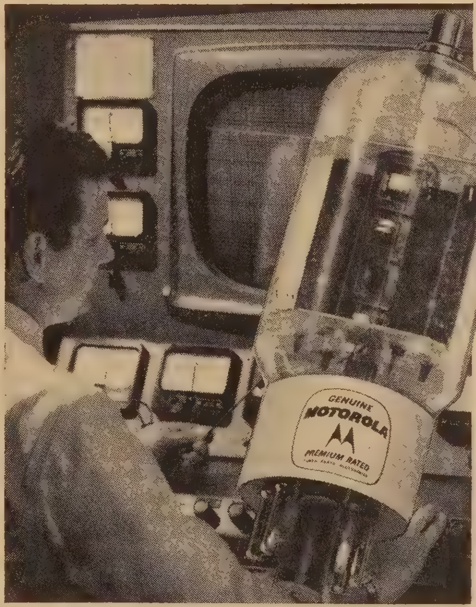


Extends to 42"
Retracts to 0"

CK SINGLE DIAL adjusts arms and signal
CK Hands NEVER touch Antenna arms

See your Distributor . . . Or write for
Literature and Specification Sheets

MARJO TECHNICAL PRODUCTS
COMPANY
1146 E. Henry Street, Linden, N. J.



Only Motorola
Torture Tests to Twice Maximum Ratings

Unique electronic testing device "works over" every Golden "M" Tube, assures 100% reliability

MOTOVAC, the Motorola-created electronic brain, torture-tests Golden "M"* Tubes to specifications that are the *highest in the entertainment-type tube industry.*

Result? The *most reliable* tubes you can buy! The kind that give you far lower "in-use" and "shelf-defective" rates than ever before.

*TRADEMARK OF MOTOROLA, INC.

MOTOROLA

Parts and Accessories Division, Franklin Park, Illinois

after
60
years
KESTER
FLUX CORE
SOLDER
Since 1899
60th
Anniversary
KESTER SOLDER

it's the radio-tv serviceman's "best friend"!

KESTER SOLDER

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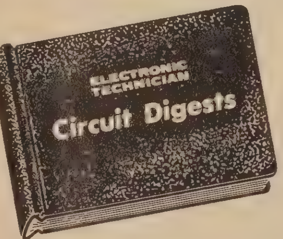

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(Continued from previous page)

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Those surplus bargains may look great at first, but in the long run, sub-standard parts will increase call-backs, and labor costs will more than offset the insignificant savings.

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Whether it be postal cards, calendars, flyers or radio, advertising will prevent your business from stagnating. It will call attention to your shop and remind your customers that their set is not "perfect." People often put off having certain work done, and advertising is a perfect method of gently reminding them that their sets need service. Always record the results of a particular campaign to discover which one appealed to the consumer. •

Association News

California

SRTT, Orange County, elected new officers as follows: Pres., Frank Rice; V.P., Gordon Mauer; Sec'y, Frank Montelli; Treas., Clifford Gebbers.

Van Nuys chapter recently held a troubleshooting clinic with Sencore Sales Manager Ed Flaxman and Rep Mark Markman. These Sencore "Time Saving Clinics" are available free of charge to service technician groups through arrangements with local distributors or the instrument company's representatives.

TSDA, San Mateo, says tax evasion charges have been leveled at do-it-yourself tube tester operators' allegedly evading tax and license payments in San Mateo County.

Florida

TESA, St. Lucie County, elected James W. Sowinsky, Pres.; Leonard A. Appel, Sec'y; John Forget, V.P., and William Montaltos, Treas.

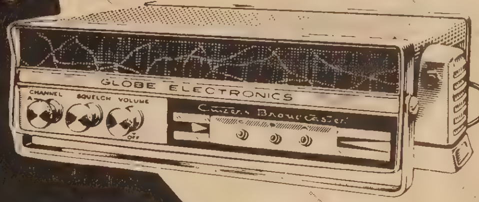
TSDA, St. Petersburg, elected Bud Fox as Pres. of their recently organized group.

Illinois

TESA, Chicago, in its association publication, prints a list of Chicago Building Trades Wage scales—furnished by the Builders Association of Chicago, showing hourly wage scales, plus fringe benefit equivalents as follows: Electricians $4.10, Painters $3.85, Carpenters $3.95 and Plumbers $4.19.

NATESA answers recent industry manufacturers who contend that their "Stop Crying, Start Selective Buying" slogan is ineffective. "We doubt the statement that selective buying has not affected sales on a regional basis," says NATESA. "Recorded facts prove otherwise." NATESA continues, "We think the statement, 'No manufacturer, by having a factory service operation, takes away service from the independent' is rank absurdity." . . . If the factory does the service in his operation, how can an independent do it?" Complete list of officers recently elected by NATESA are: Pres., Mac Metoyer; Sec'y. Gen'l., Benny Benoit; Treas., Nelson Burns; Eastern V.P., Irvin Toner; East Central V.P., Cordell Britt; West Central V.P., W. E. Johnson; Western V.P., Winston Haines; Eastern Sec'y, George Carlson; East Central Sec'y, Gerald

(*Continued on page 101*)



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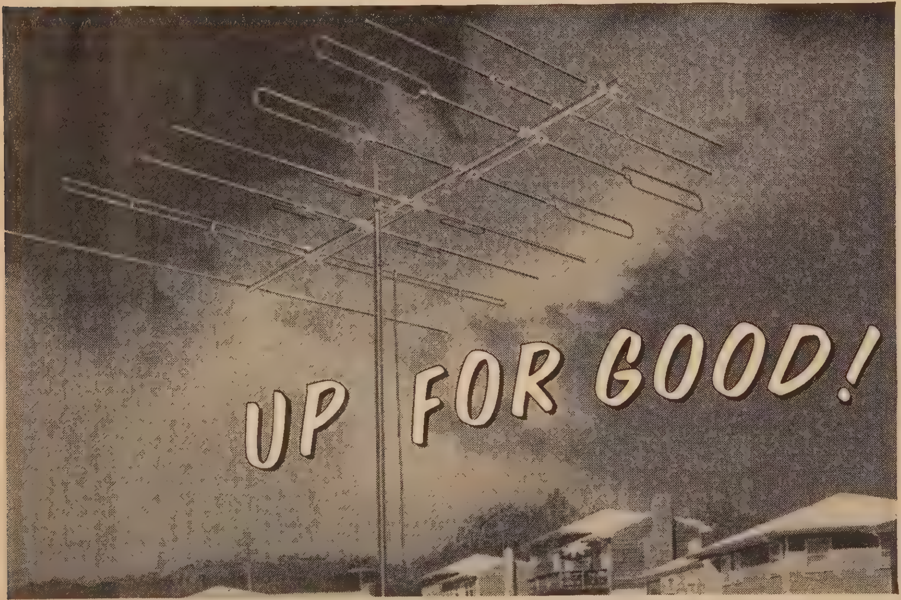

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TECHNICAL APPLIANCE CORPORATION, Sherburne, N. Y.

Video Defects

(Continued from page 41)

distortions in these circuit branches are cumulative.

Suitable values for R_3 and C_3 can be used to practically cancel tilt distortion from R_1C_1. In other words, choice appropriate values for R_3 and C_3 will provide a low-frequency boost to offset low-frequency loss in R_1C_1. At the same time, a low-frequency phase correction results. Both frequency and phase distortion occur in a coupling circuit with an inadequate time constant. However, one distortion can be used to cancel another.

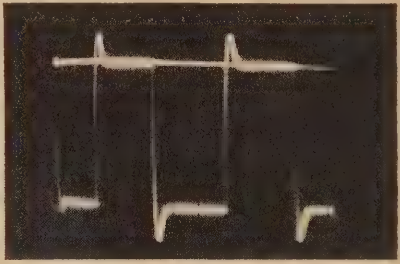
Fig. 9—Overshoot causes picture edges to be outlined by either white or dark areas.

Low-frequency boost circuits are attractive when good response is desired at low frequencies, because excessively large values of grid capacitors can thereby be avoided. Large value coupling capacitors tend to leak more than smaller capacitors. Large values of grid-leak resistance can cause grid-current difficulties.

Phase

A video amplifier has a phase characteristic, as well as a frequency characteristic. In other words, low and high frequencies may pass through a video amplifier at the same time interval, or, low frequencies may flow faster or slower through the circuit configuration.

Phase distortion is more serious than frequency distortion. It causes greater picture degradation. However, we do not normally check for phase distortion directly. This would be too difficult, and require elaborate equipment.

We can get a very practical check of phase distortion when a square-wave test is made. If a square wave is reproduced satisfactorily, the phase characteristic of the amplifier is good.

As a general rule, it is assumed that a video amplifier will have a satisfactory phase characteristic if its frequency response is flat. This is not entirely true, since much depends upon the cut-off characteristic of the amplifier. If the peaking coils (and 4.5 mc trap) have values which cause a sharp high-frequency cutoff, the amplifier will ring in spite of having a flat frequency response.

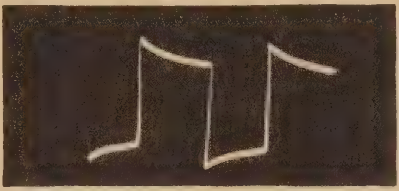

Fig. 10—Tilt in video amplifier causes a shading with a picture smear impression.

Hence, a video sweep-frequency test should be followed up with a square-wave test. It may be found that better square-wave reproduction can be obtained by compromising the frequency response to some extent.

The end result desired is good quality picture reproduction. This will be obtained if the amplifier can reproduce both low-frequency and high-frequency square waves with negligible distortion. •

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A line of 97 replacement TV knobs; "on-off," "fine tuning," "volume" and "channel selection," are claimed to provide full exact replacement coverage for eight leading brands of TV receivers. Each knob is skin-packed and carded for both protection of the merchandise and easier identification; full cross reference information is provided. G-C Electronics Co., 400 S. Wyman St., Rockford, Ill. (ELECTRONIC TECHNICIAN 11-16)

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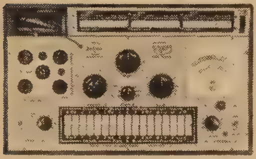

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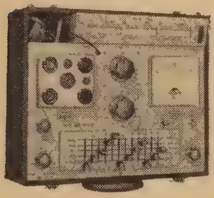

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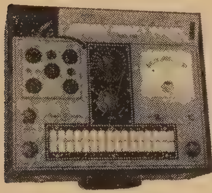

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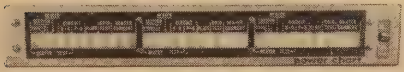

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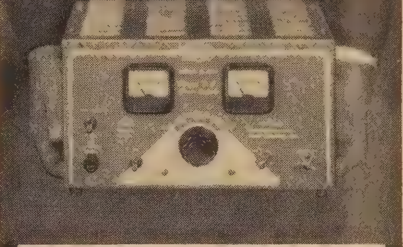

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Microphone Loading

• Technicians, usually quite familiar with the applications of high-impedance microphones, occasionally run amuck when working with low-impedance broadcast mikes. This slight confusion is only natural, since most consumer audio products contain high-impedance inputs, rather than the more expensive low-impedance ones, and the technician is therefore more familiar with the former. An increased demand for more sophisticated equipment, however, has resulted in the "professionalization" of some hi-grade preamps. This upgrading includes low-impedance mikes and inputs, enabling the user to run long mike cables without undue loss of high frequencies.

TABLE I

Microphone Impedance (ohms)	Cable Length (feet) Causing 1 db Loss at 10 kc
50	920
150	310
250	190

TABLE II

RATED AMPLIFIER INPUT IMPEDANCE

	50-ohm input impedance			150-ohm input impedance			250 -ohm input impedance		
Mike Z	effect on level	effect on 100 response	effect on 10,000 response	effect on level	effect on 100 response	effect on 10,000 response	effect on level	effect on 100 response	effect on 10,000 response
50	none	none	none	5 db loss	none	none	7 db loss	none	none
150	5 db gain	no noticeable loss	no noticeable loss	none	none	none	2 db loss	none	none
250	7 db gain	noticeable loss	noticeable loss	2 db gain	no noticeable loss	no noticeable loss	none	none	none

Applications

In a typical broadcast console the low-impedance microphone is connected to an input transformer that raises the microphone impedance (normally 50 ohm, 150 ohm, or 250 ohm) to approximately 50,000 ohms. The secondary of the transformer is connected to an open grid, which is virtually an open circuit. Therefore, the microphone is ostensibly unloaded. However, a mike that does not have a connected load will still have an output voltage across its terminals. This is the unloaded or open-circuited voltage output and is the voltage that manufacturers refer to when specifying output level and frequency response.

In some applications, broadcast microphones are connected to impedances equal to the impedance of the

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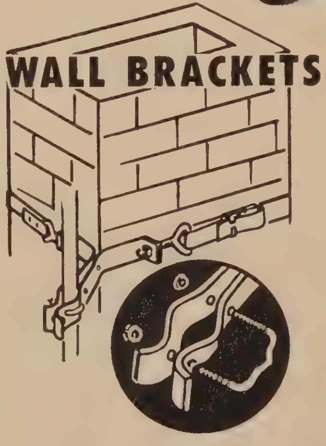

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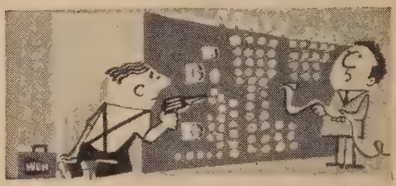

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WT-21	16-28
WT-41	27-55
WT-78	47-110
WT-165	100-230

Mosley Electronics, Inc.
St. Louis, Missouri

microphone. When this occurs, the microphone is loaded and its performance differs from that of the open circuit condition. Consequently, the microphone performance will not comply with its listed specifications.

Examples of loaded conditions are: Low-level mixing at the input of a broadcast console; the input impedance is nearly that of the microphone, resulting in a load on the mike; transistor amplifiers, usually designed with an impedance match between microphone and input stage.

Loading

Perhaps the simplest condition of loading is one where both the microphone impedance and load impedance are the same at all frequencies. This condition occurs when an essentially constant impedance microphone is connected to a purely resistive load. The frequency response undergoes no change when connected in this manner, although a loss of output is exhibited. The unchanging frequency response is a result of the output level decreasing the same amount at all frequencies.

One type of loading that is important to the user is the type where the load impedance varies with frequency and results in the mike's changed frequency response. An example of this type load is the capacitance of a standard microphone cable connecting the microphone to the input equipment. This capacitance presents an impedance that varies inversely with frequency. The amount of attenuation occurring in the high frequencies is determined by the microphone impedance and length of cable. See Table I.

Another important loading condition is where microphone impedance varies with frequency. This usually occurs when bi-directional and cardioid microphones are connected to a resistive load equal to its impedance. This results in a loss in level and a change in frequency response. The significant change is generally a reduction in bass response commonly evidenced by a "coloring" of the sound quality.

Result

Table II shows the effect of a number of possible combinations of broadcast microphone impedances and rated input impedances. Examining the table indicates that very few combinations cause a noticeable change

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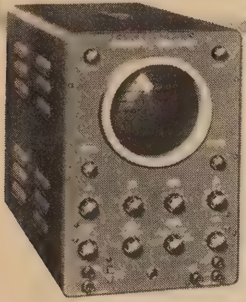

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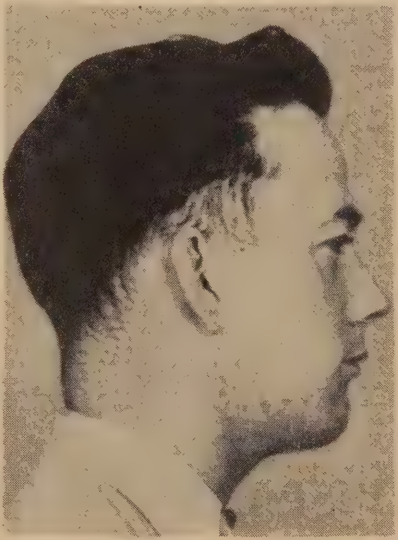
in microphone performance. Special loading problems, such as the result of using electrical filters, have not been considered in Table II, since each solution must be solved separately and is usually associated with broadcasting station equipment only.

Referring to the previously outlined information, in most applications broadcast microphones are used open-circuited and a loading effect does not exist. With care, cable capacity loading can be minimized by considering the specific microphone and desired fidelity. Bi-directional and cardioid mikes should be used open-circuited, unless bass attenuation is unimportant. In general, though, loading broadcast microphones will not severely degrade sound quality. ●

Information credit: Electro-Voice, Inc., Buchanan, Mich.

WANTED
Fugitive from Justice



JOSEPH KRETSINGER TICE, also known as Jack Carson Adams, Joseph Kretsinger, Joseph R. Thornton, is wanted by the Federal Bureau of Investigation for violation of parole.

Description

Tice was born April 12, 1927, at Dixon, Illinois. He is six feet tall, 181 to 187 pounds, medium build, brown hair, brown eyes, fair complexion. The top of his right index finger has been

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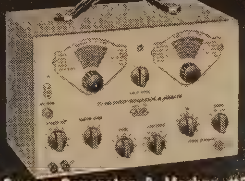


TV-FM Sweep Generator & Marker #368
Wired $119.95 Kit $69.95
Entirely electronic sweep circuit with accurately biased increductor for excellent linearity. Extremely flat RF output.

Dynamic Conductance Tube & Transistor Tester #666
Wired $109.95
Kit $69.95
Tests all receiving tubes (picture tubes with adapter), n-p-n and p-n-p transistors.

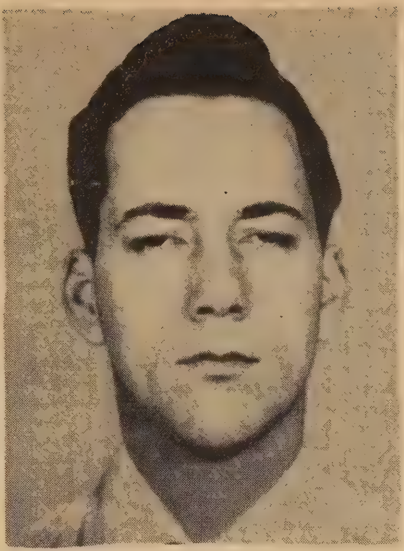
Add 5% in the West

Peak-to-Peak VTVM #232 & Uni-Probe (pat. pend.)
Wired $49.95
Kit $29.95
Uni-Probe — exclusive with EICO — only 1 probe performs all functions: half-turn of probe tip selects DC or AC-Ohms.

In stock at over 1500 distributors in the U. S. and Canada

IMPORTANT NOTE: All EICO kits built according to our instructions, and all EICO factory-assembled equipment, conform to the high standards and specifications published in EICO literature and advertisements. All EICO factory-assembled equipment is completely and meticulously **hand-wired throughout** — no printed circuitry; **each** factory-assembled unit is **100% final-tested** throughout for **each** feature and function — no "spot" or "partial" checking. In EICO's final-test techniques, **nothing is left to chance.**

EICO, 33-00 Northern Blvd., L.I.C. 1, N. Y.



Joseph Kretsinger Tice

amputated. The little and ring fingers on his right hand are partially stiff. He has a cut-scar on the inner left wrist and a bullet scar on the calf of his left leg. He has worked as a *radio and TV service technician,* electrician, merchant seaman, laborer and IBM operator.

This individual was on parole at Seattle, Washington, after conviction for Interstate Transportation of a stolen motor vehicle. In February, 1954, he violated parole by leaving Seattle after issuing worthless checks for cash and a rental of a 1953 Chevrolet. His whereabouts have not been known since February, 1954, and the rented automobile has not been recovered. He has lived in Buffalo, New York; New Orleans, Louisiana; Chicago, Illinois, and the Pacific Northwest. He has talked of going to Canada to live. Tice has been convicted of impersonating a Federal officer, forgery and interstate transportation of stolen automobiles.

Any person having information which might assist in locating this fugitive is requested to immediately notify the Special Agent in Charge of the nearest FBI Office. The telephone number appears on the first page of the local telephone directory.

At the request of the F.B.I., and as a Public Service, Electronic Technician Magazine is bringing this to the attention of its readers.

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- Lifetime service guarantee
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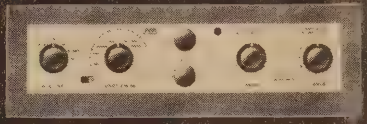
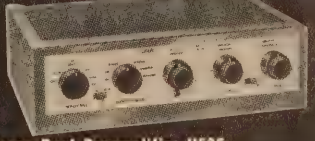
- Easy console installation

FM Tuner HFT90 Wired $65.95* Kit $39.95*
Cover $3.95. *Less cover, FET included.
"One of the best buys." — AUDIOCRAFT
AM Tuner HFT94 Wired $65.95 Kit $39.95
Includes cover & FET.
"One of the best... ideal for those wishing to add AM to their systems." — HI-FI SYSTEMS
FM/AM Tuner HFT 92 Wired $94.95
Kit $59.95 Includes cover & FET

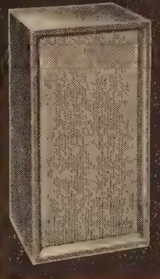


Stereo Dual Amplifier — Preamplifier HF81
Wired $109.95 Kit $69.95
"Outstanding quality . . . extremely versatile." — ELECTRONICS WORLD LAB TESTED



Stereo Dual Preamplifier HF85
Wired $64.95 Kit $39.95
"Outstanding buy." — THE AMERICAN RECORD GUIDE

Stereo Dual Power Amps
28-Watt Model HF86. Wired $74.95 Kit $43.95
70-Watt Model HF87 Wired $114.95 Kit $74.95



3-Way High Fidelity Speaker System Semi-Kits HFS-3 & HFS-5

- Complete with factory-constructed enclosure
- Easy to assemble — no gluing or woodworking

HFS-3 unfinished birch, $72.50; walnut, mahogany or teak, $87.50
HFS-5 unfinished birch, $47.50; walnut, mahogany or teak, $59.50.
Other speaker system semi-kits from $39.95.

In stock at over 1500 distributors in the U. S. and Canada

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Show me how to save 50% on top quality: ☐ Hi-Fi ☐ Test Instruments ☐ Ham Gear. Send free catalog and name of neighborhood EICO supplier.
☐ Send free STEREO Hi-Fi Guide.

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Add 5% in the West

Operate your . . .
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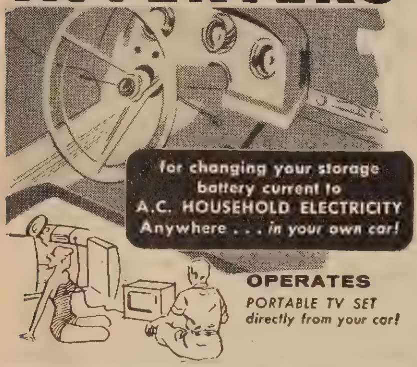
FROM YOUR CAR, Boat or Plane!
with ATR
INVERTERS



for changing your storage battery current to A.C. HOUSEHOLD ELECTRICITY Anywhere . . . in your own car!
OPERATES
PORTABLE TV SET directly from your car!

OPERATES
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• RECORD PLAYERS
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directly from your car!
MAKE YOUR CAR, BOAT OR PLANE "A ROLLING OFFICE!"

OPERATES
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ATR UNIVERSAL INVERTERS
Especially designed to change 6 or 12 volt D.C. to 110 volt A.C. 60 cycles.
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• EXECUTIVES • POLICEMEN
• SALESMEN • REPORTERS
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MODELS 6U-RHG (6 volts) 125 to 150 watts. Shipping weight 27 lbs. List price...............$99.50
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DEALER NET PRICE.......$66.34
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SEE YOUR JOBBER OR WRITE FACTORY
✓NEW MODELS ✓NEW DESIGNS ✓NEW LITERATURE
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ATR AMERICAN TELEVISION & RADIO CO.
Quality Products Since 1931
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New Books

Book marked with an asterisk (*) may be obtained prepaid from Electronic Marketers, Book Sales Division of Electronic Technician

SILICON ZENER DIODE HANDBOOK. *Published by Motorola, Inc., 5050 E. McDowell Rd., Phoenix, Ariz. 126 pages, soft cover. $1.00.*

This comprehensive handbook covering basic theory, design characteristics and applications of zener diodes alone is a tribute to the advanced stage that semiconductor theory has reached. This relatively new and versatile component is sufficient in itself to command a text devoted exclusively to it. The manual covers zener diode use in regulated power supplies, surge protection, a-c, d-c amplifiers, temperature compensation and other applications. Designers will be surprised and rather pleased by a separate chapter covering design considerations, using a special zener diode slide rule calculator (available separately from Motorola Semiconductor Distributors for $1.00). The handbook contains plentiful drawings and schematics.

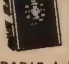
***DIGITAL COMPUTER PRIMER.** *By E. M. McCormick. Published by McGraw-Hill Publishing Co. 214 pages, hard cover. $7.50.*

Any technician wondering about the how and why of those complex devices, digital computers, will find this book of value. Awe-inspiring computer theory is translated into a completely palatable state by this relatively non-mathematical approach to the subject. Following an introductory discussion of terminology, characteristics, etc., the author concentrates on the EDPM type of general-purpose computer, in a concise, easily understood manner. A chapter describing the logical organization of Tick-Tack-Toe machines and other games occasionally exhibited at IRE shows, will provide an enlightening, yet educational, interlude for the reader.

***VIDEO SPEED SERVICING. Volume 3.** *By Samuel L. Marshall. Published by Howard W. Sams & Co., Inc. 160 pages, soft cover. $2.95.*

This third volume manual follows the format established by its predecessors; a compilation of trouble symptoms and repair methods to rectify them for specific TV receivers. Indexed by brand name, chassis and model, each receiver is accompanied by a skeleton schematic. Although some "tough dog, shop hint" type remedies are included, the large majority of service suggestions cover straightforward component replacements for specified symptoms. The average technician may find it quicker to troubleshoot the receiver than refer to a text every time a common breakdown occurs.

MASTER RECEIVING-PICTURE TUBE SUBSTITUTION GUIDEBOOK ***by H. A. Middleton***
The fabulously popular Receiving Tube Substitution Guidebook* and all four supplements has been reset, expanded and brought up to date in one master book. The original Tube Substitution Guidebooks were considered the most handy and important work books for technicians, engineers and hobbyists—the new Master book.is even more valuable. In one Master Book, that is easy to use, the entire range of all radio and television receiving and picture tubes and their substitutions are at your fingertips.
- 5100 Radio and Television Receiving Tube and 825 Picture Tube substitutions are listed in numerical sequence with accompanying wiring instructions showing the original and substitute tube socket illustrations.
- features European-American and American-European cross index listing more than 325 American to European substitutions; more than 320 European to American tube substitution.
- special section on ruggedized tubes.
This book is an indispensable tool to any person who designs, assembles or repairs radio, TV or electronic equipment. This book pays for itself almost immediately. A major portion of the first printing has been sold out, you must act now to reserve your copy. Satisfaction guaranteed. #244—8½ x 11", only $7.45.
*For a short time, the original RECEIVING TUBE SUBSTITUTION GUIDE, its three SUPPLEMENTS plus a fourth SUPPLEMENT (ready soon) will be available.
HOW TO INSTALL AND SERVICE AUTO RADIOS (2nd edition) *by Jack Darr.* The 2nd edition of this extremely informative and practical book brings auto radio installation and servicing right up to date. All the new tricks of the trade are to be found here. The techniques applicable to the most modern auto radios—signal-seeking tuners, hybrid auto radios, transistor auto radios, conversion from 6 to 12 volt operation, and many more new things are explained in great detail. The author, an expert in this field runs a very successful auto radio and mobile radio installation and service shop. This 2nd edition contains practical, proven solutions and is really a money making "tool" #159, $3.25.
RIDER ANNOUNCES NEW RECEIVING-PICTURE TUBE SUBSTITUTION GUIDEBOOK
. . . the answer to all tube substitution problems
REPAIRING PORTABLE AND CLOCK RADIOS *by Ben Crisses and David Gnessin.* You can learn all about portable and clock radios—their circuitry, their repair, in this modern book. Beginning with typical portable radio circuits, emphasis is placed on filament circuitry and how major problems of current dispersion are handled. Transistor circuitry is covered. Stress is placed on portable radio power supplies for battery circuits and battery and AC-DC circuits. Numerous battery testing techniques explained. Covers repair, replacement and alignment plus a detailed discussion of probable mechanical trouble, replacement procedures and short-cuts. Tips on extending the life of the set, are discussed. Clock radios, their circuitry, a wide variety of clock movements, how to adjust them and locate defects #224, $2.75.
REPAIRING TELEVISION RECEIVERS, *by Cyrus Glickstein.* The most modern completely practical book, written by an expert with long experience in television receiver repair. Devoted to troubleshooting and repair techniques which are modern, yet down-to-earth. Covers the use of simple as well as elaborate test equipment #191, Only **$4.40.**
ADVANCED TV SERVICING TECHNIQUES, *by Zbar and Schildkraut.* A complete advanced TV servicing course, developed by the Radio-Electronics-Television Manufacturers Association. Shows how to use every conceivable type of test equipment, how to service every part of a TV receiver. Explains latest techniques. Soft cover, 8½" x 11".
MAIN TEXT, 192 pp., illus. #161, **$3.60.**
LABORATORY WORKBOOK, 32 pp. #161-2, **$.95.**
TV PICTURE TUBE-CHASSIS GUIDE, *by Rider Lab Staff.* This easy-to-use TV tube type chassis guide covers all picture tube types used in TV receiver production from 1946 to February 1957—over 7,000 listings. Organized by chassis number, and in some cases, by models so that the technician can immediately locate the correct picture tube type simply by knowing the chassis number, #204, Only **$1.35.**
COMING IN DECEMBER
VOLUME 26
RIDER COMBINATION MANUAL



world's finest TV, TRANSISTOR and HOME RADIO data
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CITIZENS BAND
MARKET
With the NEW
4-Channel
GONSET G-12

G-12
Citizens Communicator
2-WAY RADIO

A complete 4-channel station for virtually unlimited business or private use. in car . . . truck. . . tractor . . . office . . . boat . . . plane! Operates on new 11-meter Citizens Band. Easy to obtain station license . . . merely fill out simple FCC form, no exam or special skills required.

Technician/Dealers . . .

Gonset G-12 offers you . . . the perfect inexpensive equipment to serve the big, profitable Citizens Band market. Now . . . with 4-channel equipment! Demonstrate . . . sell . . . install . . . maintain.

Multiple and Repeat Sales . . .

G-12 units can operate together as a system. Examples—industrials . . . yards, warehouses . . . aviation . . . branch businesses . . . construction. Every industrial and commercial account you have is a hot prospect!

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No tuning . . . quartz crystal-controlled channels for highest stability, reliability. Easy, press-to-talk operation . . . has front-panel channel selector, noise limiter, superhet receiver with RF stage, adjustable squelch, transmitter tune indicator. Is fully FCC type accepted.

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Employs latest electronic design techniques. Is rugged, compact. Only 4½" H, 7" W, by 10"D. Weighs 11 lbs. Has gimbal mount, built-in 12V DC/117VAC universal power supply for fixed or mobile service.

149^{95} per unit

WITH P-T-T MICROPHONE
AND CRYSTALS FOR ONE CHANNEL.

Send coupon for FREE Citizens Band Booklet . . .

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Gentlemen: Rush complete details on your technician dealer plan and free booklet: "11-meter Citizens' Band Radio"

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GONSET
Division of Young Spring & Wire Corporation
801 SOUTH MAIN ST., BURBANK, CALIFORNIA

Association News

(*Continued from page 93*)

Hall; West Central Sec'y, LeRoy Ragsdale and Western Sec'y, O. W. Andrews.

Indiana

ITTA, Indianapolis, in a letter to W. C. Pecht, Editor, "TEAM NEWS," St. Louis, says in part: "We feel that the exaggeration of incidentals and the obvious distortion of facts concerning ITTA's affiliation with NATESA, tend to reflect on ITTA in an unfavorable manner. We heartily resent these implications."

In another letter from Indianapolis to NATESA, Frank J. Teskey states: "ITTA voted by an overwhelming majority to continue affiliation with NATESA."

Massachusetts

ETG, Boston, recently presented an engraved certificate of lifetime membership to Hyman Leve, now a member of the Board of Directors, by Pres. Larry McEvoy. He has been active in the organization since it was first founded in 1933, as the Radio Technicians Guild, and was its treasurer for 25 years.

Missouri

TESA, St. Louis, reports that Channel 11, KPLR-TV will no longer air any ads offering "free tube check." The TV station decided not to expose viewers to anything that may be "bait advertising" after talking with TESA officers and the Better Business Bureau.

TESA-SW chapter recently elected Bill Moudy, Pres.; Lee Hopkins, V.P.; Ed Muhleman, Treas. George Scott was retained as Sec'y.

North Carolina

NCFEA, Charlotte, at its first annual convention following new officers were installed: Ken LaRue, Pres., Chas. McBroon, V.P., Joe Woods, Treas. and Ray Stanley, Sec'y.

Ohio

ARTSD, Columbus, membership voted to establish a committee to formulate a licensing program.

Pennsylvania

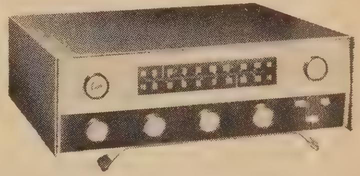
ESDA, Pittsburgh, Publicity Director, David J. Baird, reports some members are devoting more time in organization work than in their own shops. "Not because we can afford it," he said, "but we know we must if we are to stay in business and secure our future."

BOGEN
the sound way to better business

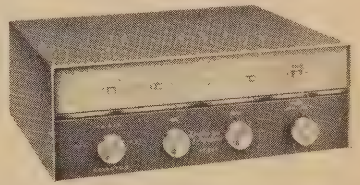
NEW POPULAR-PRICED STEREO LINE FROM THE TOP NAME IN HI FI!

CHALLENGER COMPONENTS
BY BOGEN

Now you can offer your budget conscious customers top-quality stereo components at remarkable savings. It's the *Challenger* line by Bogen...and it's true high fidelity at truly low prices. Built to the same exacting engineering standards as the regular Bogen line, these *Challenger* components give you premium features you can sell with pride...sales-closing price tags you can push with profit! Look 'em over at your distributor. Or, mail the coupon.



RC412 Stereo Receiver. An all-in-one stereo amplifier, stereo control center and stereo FM-AM tuner, the RC412 has dual volume controls to permit one-hand balancing of the two channels and built-in provision for a multiplex adapter. Power output: 12 watts (6 per channel). Frequency response: 30 to 15,000 cps ±1 db. Price: $169.50. Enclosure and legs: $8.50.

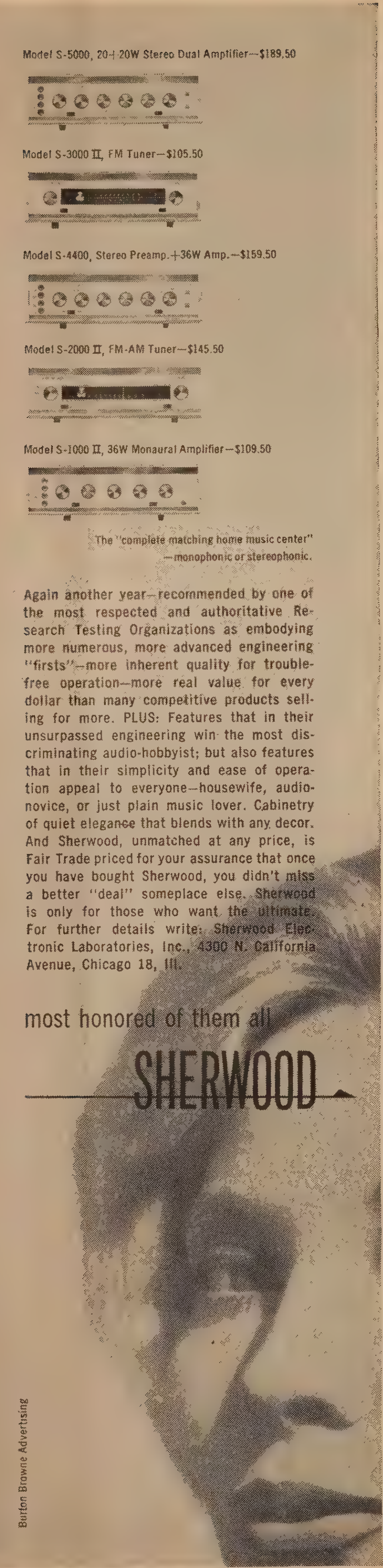


AC220 Stereo Control Center and Dual 10-Watt Amplifier. An astonishing value, the AC220 features low-noise preamp, low distortion, dual volume controls, loudness switch, channel reversing switch, provision for tape deck and mono-stereo mode selector. Comes complete with enclosure. Price: $79.95. Leg kit: $1.85.

TC322 FM-AM Stereo Tuner. (Matches AC220) The sensitive TC322 receives stereo FM-AM, FM or AM broadcasts. It features: AFC, provision for multiplex adapter, automatic volume control, illuminated dial scale, and comes complete with enclosure. Frequency response: FM: 20 to 15,000 cps ±1 db; AM: 20 to 3,500 cps ±1.5 db. Price: $109.50. Leg kit: $1.85.

BOGEN-PRESTO, DEPT. ET-119, PARAMUS, N. J.
A Division of the Siegler Corporation
Please send me more information on the new Challenger components.

Name
Address
City Zone State



Model S-5000, 20+20W Stereo Dual Amplifier—$189.50

Model S-3000 II, FM Tuner—$105.50

Model S-4400, Stereo Preamp.+36W Amp.—$159.50

Model S-2000 II, FM-AM Tuner—$145.50

Model S-1000 II, 36W Monaural Amplifier—$109.50

The "complete matching home music center"
—monophonic or stereophonic.

Again another year—recommended by one of the most respected and authoritative Research Testing Organizations as embodying more numerous, more advanced engineering "firsts"—more inherent quality for trouble-free operation—more real value for every dollar than many competitive products selling for more. PLUS: Features that in their unsurpassed engineering win the most discriminating audio-hobbyist; but also features that in their simplicity and ease of operation appeal to everyone—housewife, audio-novice, or just plain music lover. Cabinetry of quiet elegance that blends with any decor. And Sherwood, unmatched at any price, is Fair Trade priced for your assurance that once you have bought Sherwood, you didn't miss a better "deal" someplace else. Sherwood is only for those who want the ultimate. For further details write: Sherwood Electronic Laboratories, Inc., 4300 N. California Avenue, Chicago 18, Ill.

most honored of them all

SHERWOOD

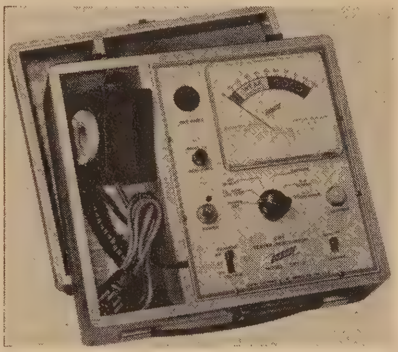
Burton Browne Advertising

FOR COMPLETE SPECIFICATIONS WRITE DEPT ET-11

Washington

TSA, Seattle, reports eleven NATA shops are meeting weekly with local 46 of the IBEW. Subjects being discussed, among other things, are wages, shop hours, apprentice training and jurisdition of electronic service work.

Century TESTER-REACTIVATOR



Employing a number of features, including a "multi-head" test cable, eliminating the necessity for other cables and adapters, the Model CRT2 is reported to test, repair and reactivate all B/W or color tubes. Separate filament voltages are provided, including the latest 2.35 and 8.4 v. types. In oak carrying case with a compartment. Price $57.50. Century Electronics Co., 111 Roosevelt Ave., Mineola, N. Y. (ELECTRONIC TECHNICIAN 11-15)

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF ELECTRONIC TECHNICIAN, published monthly at Bristol, Conn., for October 1, 1959.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Howard A. Reed, 174 Waverly Rd., Scarsdale, N. Y.; Editor, Albert J. Forman, Woodbrook Dr., Stamford, Conn.; Managing Editor, Arthur P. Salsberg, 430 Saratoga Ave., Brooklyn, N. Y.; Business Manager, none.

2. The owner is (if owned by a corporation its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given.) Electronic Technician, Inc., 480 Lexington Ave., New York 17, N. Y.; Beatrice S. Berger, 109-01 72 Rd., Forest Hills, N. Y.; Charles F. Dreyer, 300 Hayward Ave., Mt. Vernon, N. Y.; Albert J. Forman, Woodbrook Dr., Stamford, Conn.; Nancy M. McGaughan, 83-02 Cornish Ave., Elmhurst, N. Y.; Robert E. Nickerson, 27 Meadowbank Rd., Old Greenwich, Conn.; Howard A. Reed, 174 Waverly Rd., Scarsdale, N. Y.; Morris J. Rubin, 70-33 175 St., Flushing 65, N. Y.

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(Signed) ALBERT J. FORMAN, Editor

Sworn to and subscribed before me this 17th day of September, 1959.

MORRIS J. RUBIN, Notary Public
State of New York, No. 41-3389950
Queens County
Term expires March 30, 1961

NEW
PYRAMID® POINT
BY FIDELITONE

Shaped to follow the record grooves exactly . . . pick up all the recorded sound

New Pyramid Point Diamond	Ordinary Round Diamond
Traces the centerline of the microgroove with more surface contact. Accurately contacts all frequency areas. Assures minimum distortion, maximum true sound.	Does not trace the centerline of the groove. Has less surface contact. Pinches and rides bumpily in high frequency areas—distorts many sound impressions.

It's here! The new Pyramid Point Diamond — the only needle shaped to simulate the original recording stylus. This exclusive new pyramid shape reduces distortions as much as 85%! Now, for the first time, the full pure tones of all the original recorded sound — stereo and monophonic — are faithfully reproduced. And the greater surface contact area between needle and record prolongs your needle and record life.

Be one of the first to install this newest needle discovery — the new Pyramid Point Diamond. Contact your Fidelitone distributor today.

Over 30 years of quality needles

Fidelitone

Chicago 26, Illinois
"Best buy on records"

INDEX TO ADVERTISERS
November, 1959

Aerovox Corp. 18
Agency: Lescarboura Advertising, Inc.
Allied Radio 98
Agency: George Brodsky Advertising, Inc.
American Television & Radio Co. 100
Agency: Firestone-Goodman Adv Agency, Inc.
Amperex Electronic Corp. 98
Agency: Sam Groden, Inc.
Amphenol-Borg Electronics Corp. 4
Agency: Burton Browne Advertising
Astatic Corp. Cover III
Agency: R. J. McCallister Co.
Atlas Sound Corp. 94
Agency: Zam & Kirshner, Inc.
B & K Manufacturing Co. 57, 64
Agency: Henry H. Teplitz Adv Agency
Bogen-Presto Co. 101
Agency: Friend-Reiss Advertising, Inc.
Bussmann Manufacturing Co. 69
Agency: Henderson Advertising Co.
Castle TV Tuner Service 103
CBS Electronics 9, 10, 11
Agency: Bennett & Northrop, Inc.
Centralab Div., Globe-Union, Inc. 78
Agency: Stral Advertising Co.
Channel Master Corp. 26, 27
Agency: Duso Advertising Inc.
Chicago Miniature Lamp Works 90
Agency: Merchandising Advertisers Inc.
Cornell-Dubilier Electric Corp. 58, 59
Agency: Friend-Reiss Advertising, Inc.
Delco Radio Div., General Motors 24
Agency: Campbell-Ewald Co.
Duotone Co. 90
Agency: Halsted & Van Vechten, Inc.
EICO 99
Agency: Zam & Kirshner, Inc.
Electronic Technician 89, 92
Electro Products Laboratories 95
Agency: Robertson, Buckley & Gotsch, Inc.
Electro-Voice, Inc. 13
Agency: Henry H. Teplitz Adv Agency
Erie Resistor Corp. 82
Agency: Meldrum & Fewsmith, Inc.
Fidelitone, Inc. 102
Agency: W. D. Lyon Co., Inc.
G-C Electronics Co. 77
Agency: Paul J. Steffen Co.
General Electric Co. 16, 17
Agency: Maxon, Inc.
Globe Electronics, Div. of Textron, Inc. 93
Agency: Town Crier Agency
Gonset Division 101
Agency: Clayton F. Bane Adv Agency
Heath Co. 74
Agency: Advance Advertising Service, Inc.
Hickok Electrical Instrument Co. 60, 61
Agency: Ritchie & Sattler, Inc.
International Electronics Corp. 20
Agency: Schneider-Stogel Co.
International Resistance Co. 62, Cover II
Agency: Arndt, Preston, Chapin, Lamb & Keen, Inc.
Jackson Electrical Instrument Co. 95
Agency: R. L. Conhaim Advertising
Jensen Manufacturing Co. 104
Agency: Burton Browne Advertising
Jerrold Electronics Corp. 80
Agency: Lavenson Bureau of Advertising Inc.
JFD Electronics Corp. 14, 15
Agency: Delphi Advertising Inc.
JW Electronics 86
Kester Solder Co. 92
Agency: Paul J. Steffen Co.
Mallory & Co., Inc., P. R. 54, 55
Agency: The Aitkin-Kynett Co., Inc.
Marjo Technical Products Co. 91
Agency: Advent Associates, Inc.
Mercury Electronics Corp. 79
Agency: Nat Kermin Advertising
Miller Co., J. W. 75
Agency: Balsam Advertising
Mosley Electronics, Inc. 97
Agency: H. George Bloch, Inc.
Moss Electronic, Inc. 67
Agency: Bass & Co.
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Quam-Nichols Co. 86
Agency: Stral Advertising Co.
Radio Corporation of America 28, Cover IV
Agency: Al Paul Lefton Co.
Raytheon Co. 22, 23
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Reeves Soundcraft Corp. 62
Agency: The Wexton Co., Inc.
Rider Publisher, Inc., John F. 100
Agency: Jack Gilbert Associates
Rockbar Corp. 21
Agency: The Wexton Co., Inc.
Rohn Manufacturing Co. 31
Agency: Jackson, Haerr, Peterson & Hall, Inc.
Sangamo Electric Co. 5
Agency: Arthur R. Mogge, Inc.
Scott, Inc., H. H. 89
Agency: Arnold & Co., Inc.
Seco Manufacturing Co. 72
Agency: Firestone-Goodman Adv Agency, Inc.
Sencore—Service Instruments Corp. 81, 83, 85, 87
Agency: R. N. Johnson Advertising
Sherwood Electronic Laboratories, Inc. 102
Agency: Burton Browne Advertising
Simpson Electric Co. 71
Agency: The Fensholt Advertising Agency, Inc.
Sonotone Corp. 30
Agency: Doherty, Clifford, Steers & Shenfield, Inc.
South River Metal Products Co., Inc. 96
Agency: South River Advertising & Printing
Sprague Products Co. 32
Agency: The Harry P. Bridge Co.
Stromberg-Carlson Co. 8
Agency: The Rumrill Company, Inc.
Sylvania Div., General Telephone & Electronics 50, 51, 63, 84
Agency: J. Walter Thompson Co.
Technical Appliance Corp. 94
Agency: Lescarboura Advertising, Inc.
Triad Transformer Corp. 89
Agency: Fletcher Richards, Calkins & Holden, Inc.
Triplett Electrical Instrument Co. 2, 3
Agency: Burton Browne Advertising
TungSol Electric Inc. 65
Agency: E. M. Freystadt Associates, Inc.
Utah Radio & Electronic Corp. 19
Agency: Wright, Campbell & Suitt, Inc.
V-M Corporation 29
Agency: Mayer-Klann-Linabury Advertising Inc.
Wen Products, Inc. 96
Agency: Burton Browne Advertising
Westinghouse Electric Corp. 73
Agency: Grey Advertising Agency, Inc.
Winegard Co. 6, 7
Agency: Gourfain-Loeff, Inc.
Winston Electronics 90
Agency: Steiner & Wall Advertising, Inc.
Xcelite, Inc. 88
Agency: Howard W. Nareau Advertising
Zalytron Tube Corp. 76
Agency: Bergman Advertising Agency

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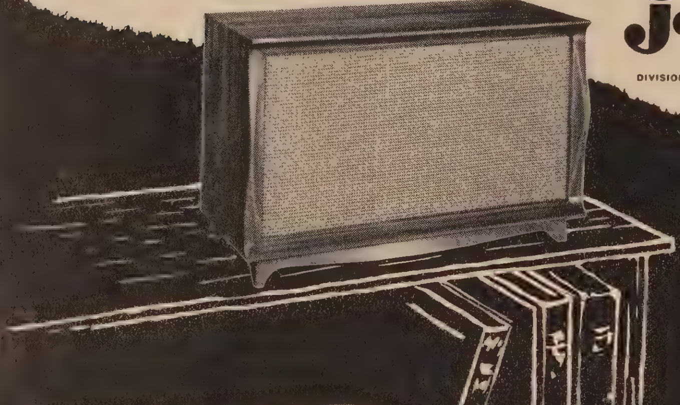
WRITE FOR
BROCHURE KP

*T.M.



TR-10
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$119.50

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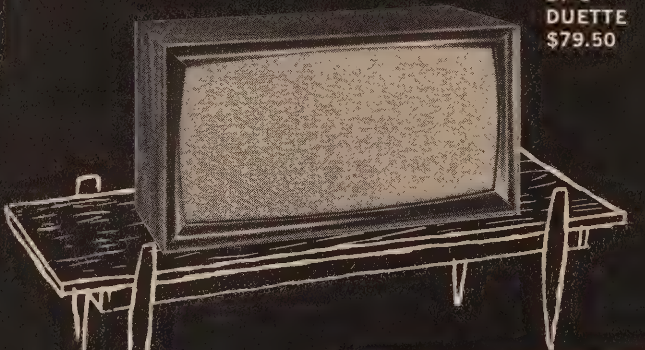

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UNFINISHED
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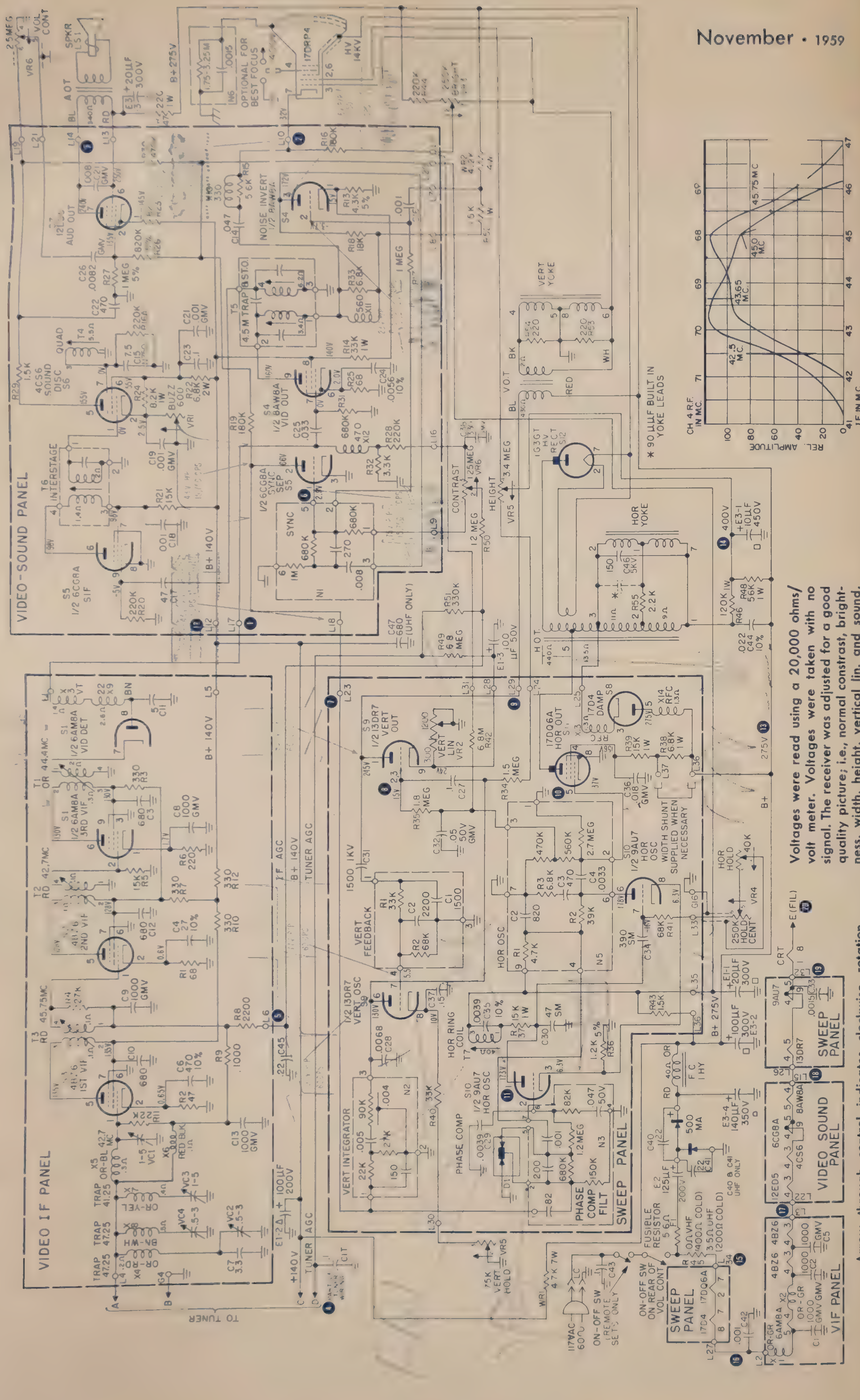
November • 1959


VIDEO - SOUND PANEL
VIDEO I F PANEL
SWEEP PANEL
VIDEO SOUND PANEL
VIF PANEL
VERT INTEGRATOR
VERT FEEDBACK
PHASE COMP
HOR OSC
HOR RING COIL
VERT YOKE
HOR YOKE
NOISE INVERT
SYNC
TO TUNER
CONTRAST
HEIGHT
HOR HOLD
VERT HOLD
FUSIBLE RESISTOR
ON-OFF SW ON REAR OF VOL CONT
117VAC 60~
OPTIONAL FOR BEST FOCUS
17DRP4
HV 14KV
* 90 μμF BUILT IN YOKE LEADS
REL AMPLITUDE
CH 4 R.F. IN MC
I.F. IN MC
45.75 MC
42.5 MC
43.65 MC
45 MC

Overall R-F I-F Response Curve

Voltages were read using a 20,000 ohms/volt meter. Voltages were taken with no signal. The receiver was adjusted for a good quality picture; i.e., normal contrast, brightness, width, height, vertical lin. and sound, picture in sync, then removed signal.

Arrow through control indicates clockwise rotation.

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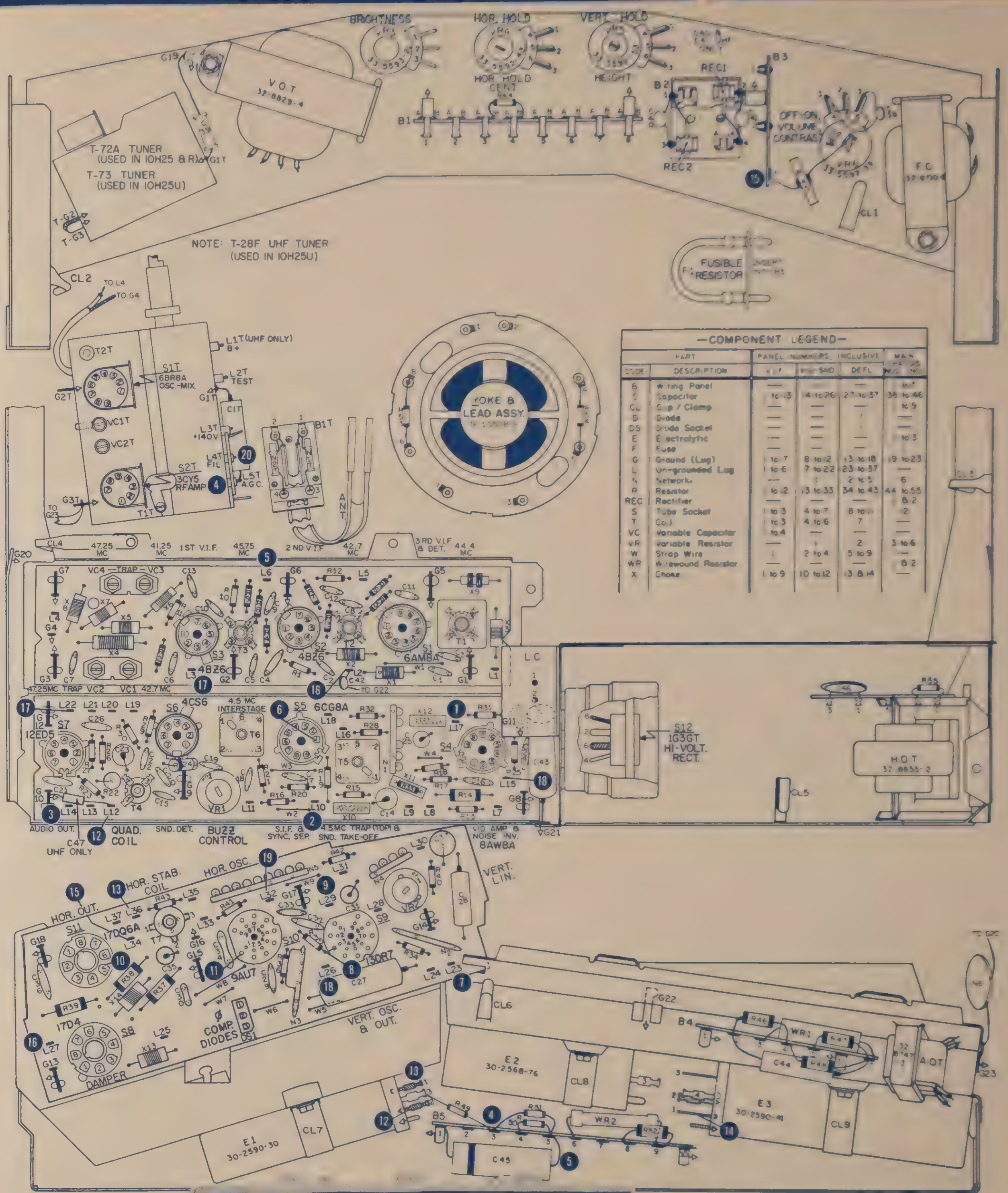
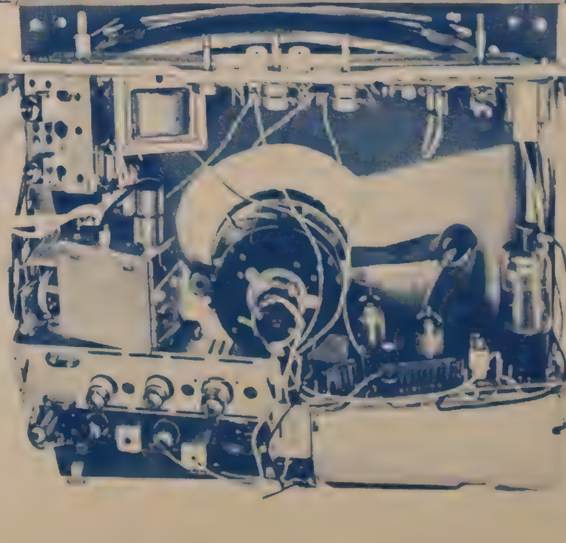
ELECTRONIC TECHNICIAN CIRCUIT DIGEST 532

PHILCO
TV Chassis 10H25, 10H25U, 10H25R


BRIGHTNESS
HOR. HOLD
VERT. HOLD
HOR HOLD CENT
HEIGHT
V.O.T.
T-72A TUNER (USED IN 10H25 & R)
T-73 TUNER (USED IN 10H25U)
NOTE: T-28F UHF TUNER (USED IN 10H25U)
OFF-ON VOLUME CONTRAST
FUSIBLE RESISTOR
YOKE & LEAD ASSY.
1ST V.I.F.
2ND V.I.F.
3RD V.I.F. & DET.
12ED5
4CS6
6CG8A
4BZ6
6AM8A
AUDIO OUT.
QUAD. COIL
SND. DET.
BUZZ CONTROL
S.I.F. & SYNC. SEP.
VID. AMP & NOISE INV.
HOR. OUT
HOR. STAB. COIL
HOR. OSC.
VERT. LIN.
VERT. OSC. & OUT.
DAMPER
COMP. DIODES
1G3GT HI-VOLT. RECT.
H.O.T.

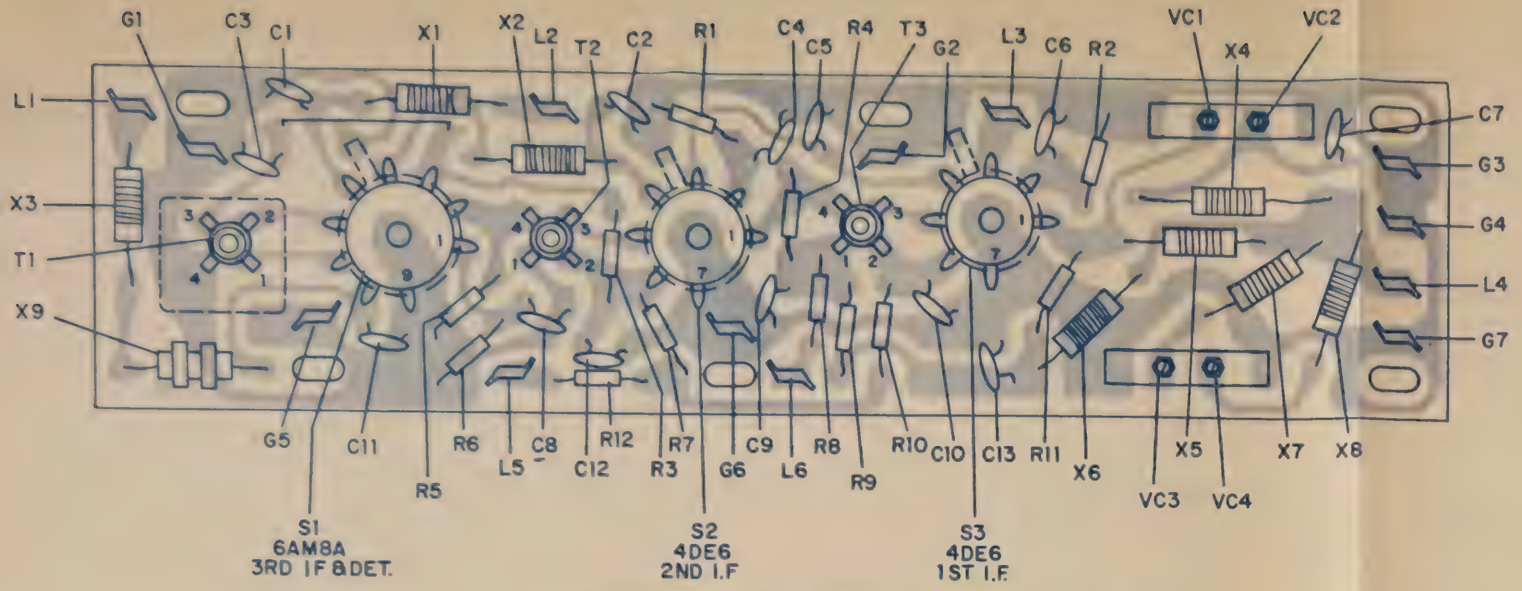
PART		PANEL NUMBERS, INCLUSIVE			MAIN CHASSIS
CODE	DESCRIPTION	VIF	VID SND	DEFL	
B	Wiring Panel	—	—	—	[illegible]
C	Capacitor	1 to 13	14 to 26	27 to 37	38 to 46
CL	Clip / Clamp	—	—	—	1 to 9
D	Diode	—	—	1	—
DS	Diode Socket	—	—	1	—
E	Electrolytic	—	—	—	1 to 3
F	Fuse	—	—	—	
G	Ground (Lug)	1 to 7	8 to 12	13 to 18	19 to 23
L	Un-grounded Lug	1 to 6	7 to 22	23 to 37	—
N	Network	—	1	2 to 5	6
R	Resistor	1 to 12	13 to 33	34 to 43	44 to 55
REC	Rectifier	—	—	—	1 & 2
S	Tube Socket	1 to 3	4 to 7	8 to 11	12
T	Coil	1 to 3	4 to 6	7	—
VC	Variable Capacitor	1 to 4	—	—	—
VR	Variable Resistor	—	1	2	3 to 6
W	Strap Wire	1	2 to 4	5 to 9	—
WR	Wirewound Resistor	—	—	—	1 & 2
X	Choke	1 to 9	10 to 12	13 & 14	—

Chassis Component Layout



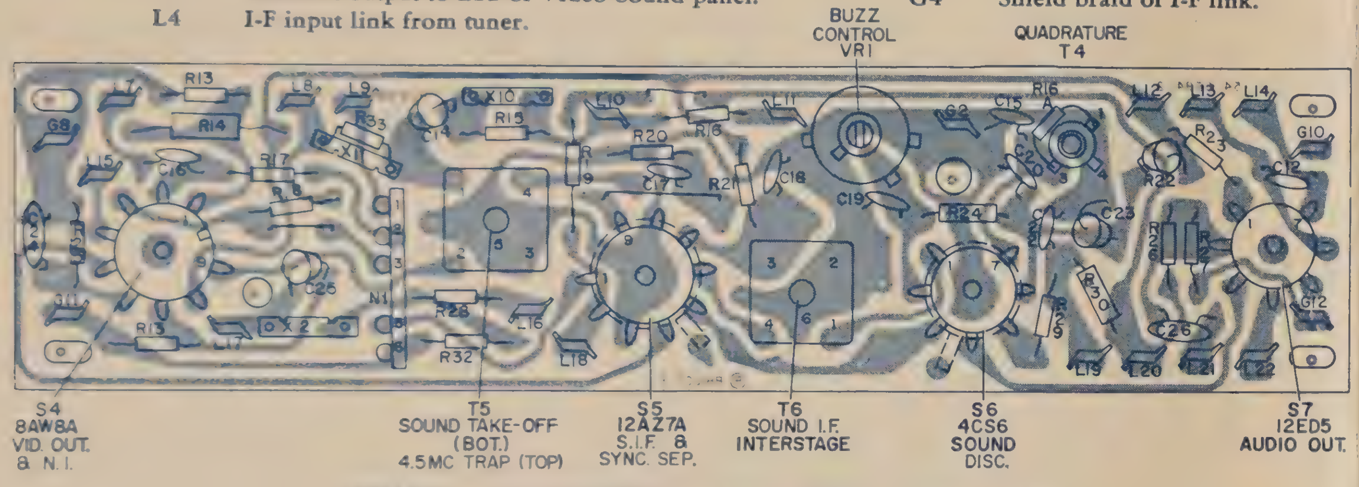
More Data on Reverse Side

Electronic Technician
CIRCUIT DIGEST 532


G1
C3
C1
X1
X2
L2
T2
C2
R1
C4
C5
R4
T3
G2
L3
C6
R2
VC1
VC2
X4
L1
X3
T1
X9
C7
G3
G4
L4
G7
G5
C11
R6
C8
L5
C12
R12
R7
R3
C9
G6
L6
R8
R9
R10
C10
C13
R11
X6
X5
X7
X8
VC3
VC4
R5
S1
6AM8A
3RD IF & DET.
S2
4DE6
2ND I.F
S3
4DE6
1ST I.F

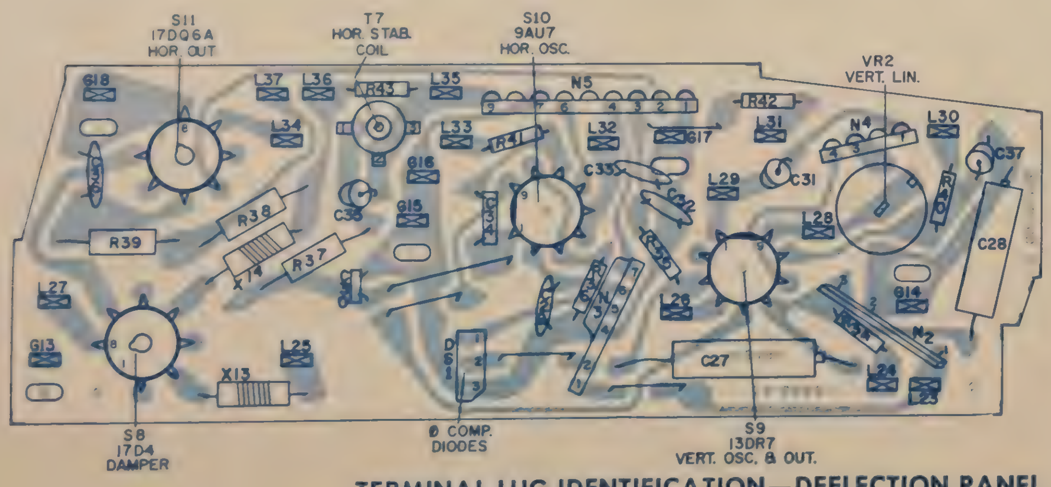
TERMINAL LUG IDENTIFICATION—I-F PANEL

L1	Video output from video 2nd detector.	L5	140V B+.
L2	Filament input from L27 of Deflection panel.	L6	A.G.C.
L3	Filament output to L22 of Video-Sound panel.	G4	Shield braid of I-F link.
L4	I-F input link from tuner.		


BUZZ CONTROL VR1
QUADRATURE T4
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R28
R32
X10
X11
X2
C14
C15
C16
C17
C18
C19
C23
C25
C26
G8
G9
G10
G11
G12
L7
L8
L9
L10
L11
L12
L13
L14
L15
L16
L17
L18
L19
L20
L21
L22
N1
S4
8AW8A
VID. OUT.
& N. I.
T5
SOUND TAKE-OFF
(BOT.)
4.5MC TRAP (TOP)
S5
12AZ7A
S.I.F. &
SYNC. SEP.
T6
SOUND I.F.
INTERSTAGE
S6
4CS6
SOUND
DISC.
S7
12ED5
AUDIO OUT.

TERMINAL LUG IDENTIFICATION—VIDEO-SOUND PANEL

L7	Lead from noise inverter grid coupling (C16) to junction of R52 and WR2 (B5-9).	L15	Filament lead to L26 of Sweep panel.
L8	Lead to video plate supply, R52, at B5-8.	L16	Lead to contrast control, VR6-3.
L9	Lead to lug #1 of VR6, the contrast control.	L17	Video input from 2nd detector, L1 of V.I.F. panel.
L10	Video output to CRT cathode, pin 7.	L18	Sync output to L23 of Sweep panel.
L11	Lead to arm of brightness control, VR3.	L19	Shielded lead to top of volume control.
L12	140V B+ lead.	L20	265V B+.
L13	Red lead of A.O.T. and B+ to audio output screen.	L21	Shielded lead from arm of volume control.
L14	Blue lead of A.O.T. to audio output plate.	L22	Filament lead from L3 of V.I.F. panel.

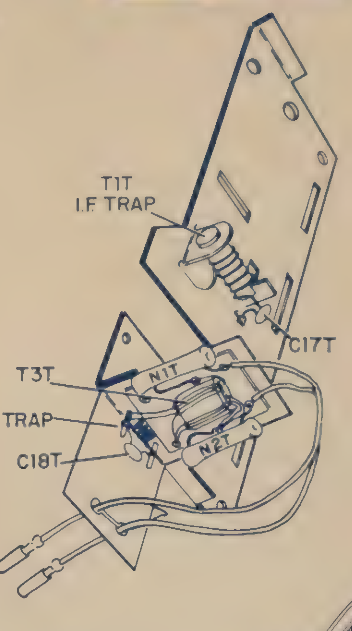

S11
17DQ6A
HOR. OUT.
T7
HOR. STAB.
COIL
S10
9AU7
HOR. OSC.
VR2
VERT. LIN.
G18
L37
L36
R43
L35
N5
R42
L30
L34
L33
R41
L32
G17
L31
N4
C37
G16
C33
C31
L29
G15
C35
R38
L28
R39
R37
X14
C28
L27
G14
N2
G13
L25
X13
D1
C27
L24
S8
17D4
DAMPER
& COMP.
DIODES
S9
13DR7
VERT. OSC. & OUT.

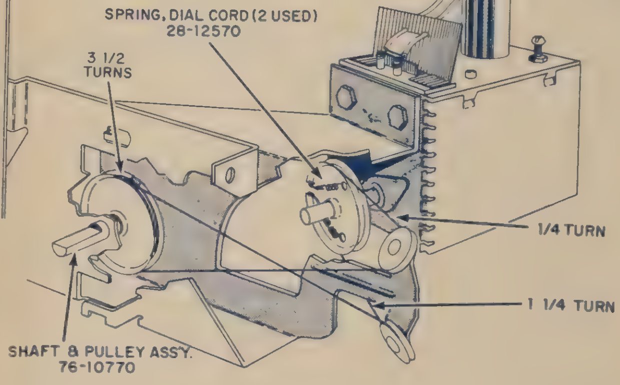
TERMINAL LUG IDENTIFICATION—DEFLECTION PANEL

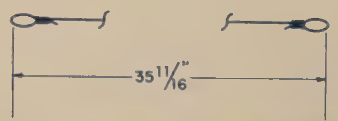
L23	Sync input from Video-Sound panel (L18).
L24	Lead to top of height control, VR5-6.
L25	Lead from damper cathode to H.O.T. terminal 3 and yoke socket pin 2.
L26	Filament lead to 13DR7 pin 4 from L15 of Video-Sound panel.
L27	Filament lead from 17D4 pin 8 to V.I.F. panel lug, L2.
L28	Vertical output cathode, lead to E1-3 by-pass electrolytic.
L29	Vertical output plate, blue lead of V.O.T.
L30	Lead to top of vertical hold control, VR5-3.
L31	Vertical output bias, lead to Video-Sound panel (L11).
L32	Filament lead from pins 4 and 5 of 9AU7 to C.R.T. pin 1.
L33	Shielded lead to horizontal hold centering control, VR4-6.
L34	Filament lead from surge resistor to 17DQ6A pin 7.
L35	De-coupled B+, 265V.
L36	275 V B+.
L37	Junction of R38 and R39, width shunt when used.

PHILCO
TV Chassis 10H25, 10H25U, 10H25R

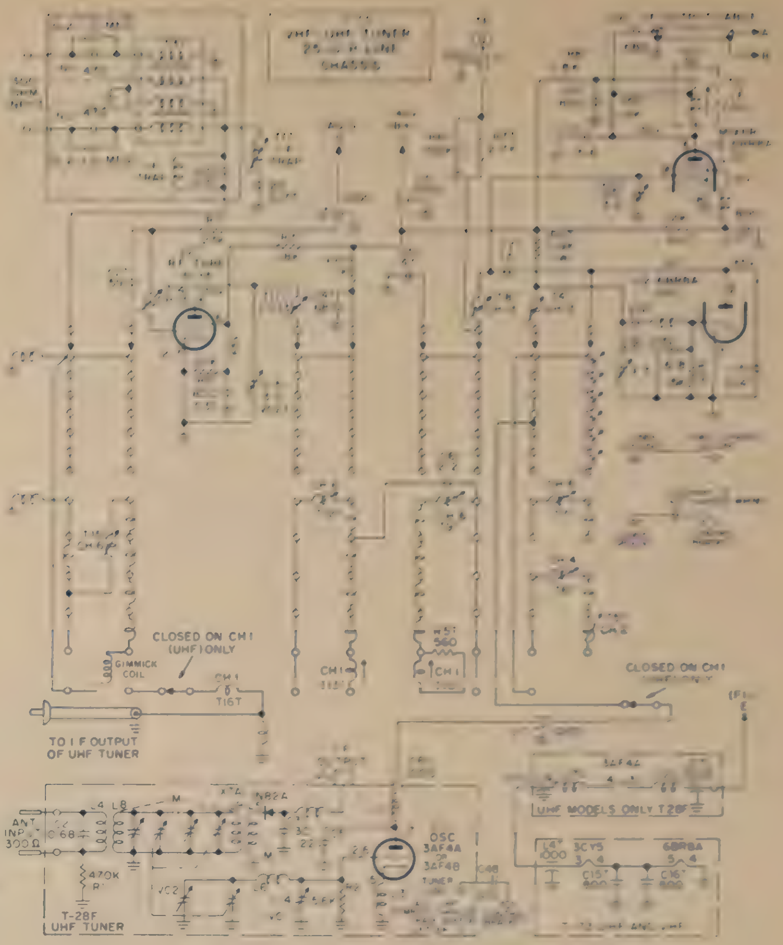
Electronic Technician
CIRCUIT DIGEST
532

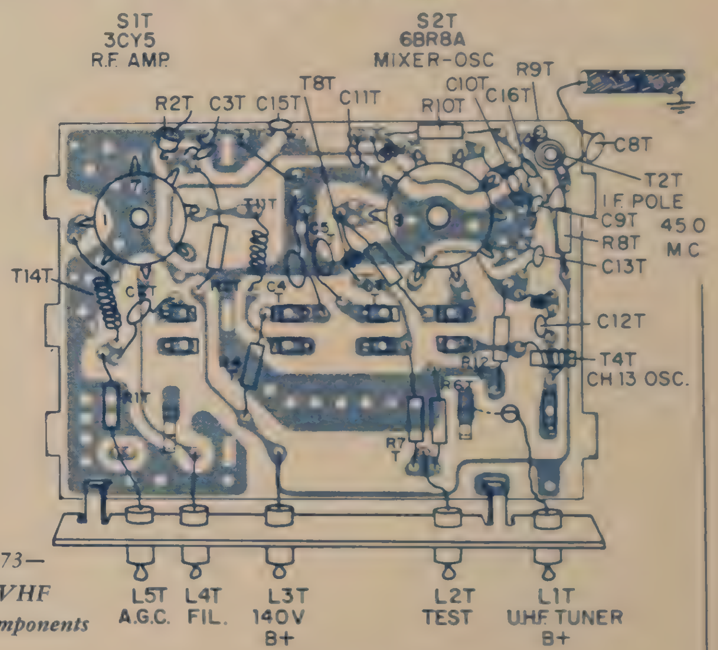

T1T
I.F TRAP
C17T
T3T
I.F. TRAP
C18T
N1T
N2T


SPRING, DIAL CORD (2 USED)
28-12570
3 1/2
TURNS
1/4 TURN
1 1/4 TURN
SHAFT & PULLEY ASSY.
76-10770



10H25U UHF Drive Cord Stringing


CLOSED ON CH1
(UHF) ONLY
CLOSED ON CH1
TO I F OUTPUT
OF UHF TUNER
UHF MODELS ONLY
ANT
INPUT
300 Ω
470K
T-28F
UHF TUNER
OSC


S1T
3CY5
R.F. AMP.
S2T
6BR8A
MIXER-OSC
R9T
R2T
C3T
C15T
T8T
C11T
R10T
C10T
C16T
C8T
T2T
I.F. POLE
45.0
MC
C9T
R8T
C13T
T14T
C4T
C5T
C12T
T4T
CH 13 OSC.
R6T
R7T
L5T
A.G.C.
L4T
FIL.
L3T
140V
B+
L2T
TEST
L1T
UHF TUNER
B+

Tuner T-73—
UHF-VHF
Electrical Components

T-73 Components Not Shown on Layout

VC1T and VC2T omitted to simplify drawing.
C14T, R11T and T16T (UHF input coil) mounted underneath panel.
C1T, A-G-C by-pass, mounted along feed-thru strip.
C6T wires between the r-f plate and mixer grid wafers.
R5T wires across the channel 1 coil of the mixer grid wafer.

More Data on Reverse Side

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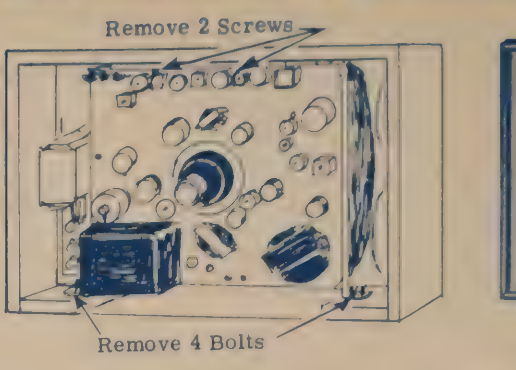
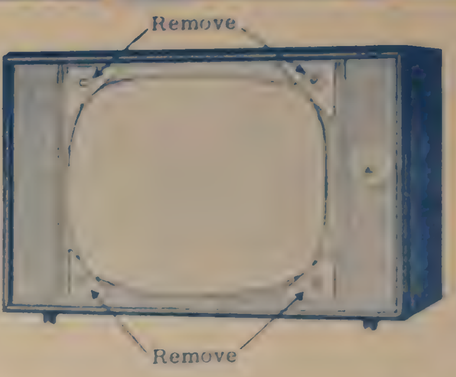
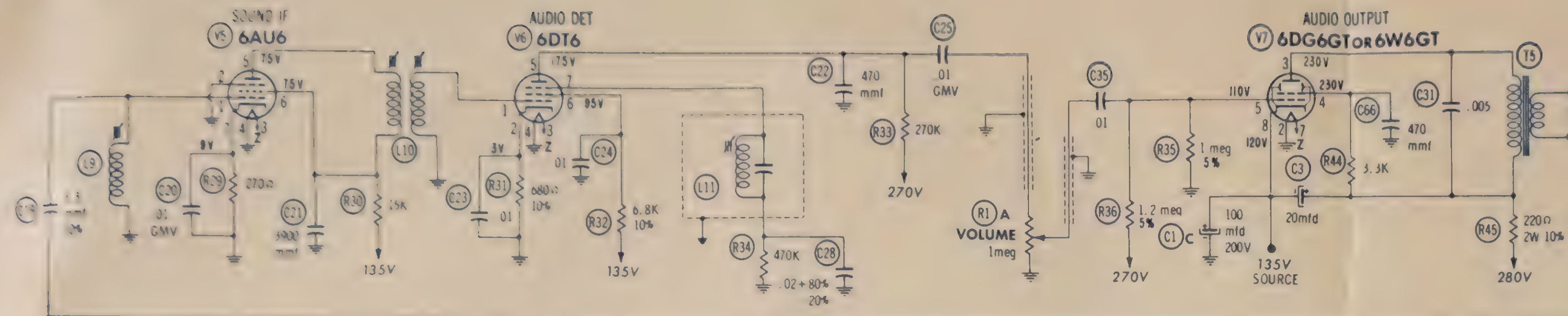
November • 1959

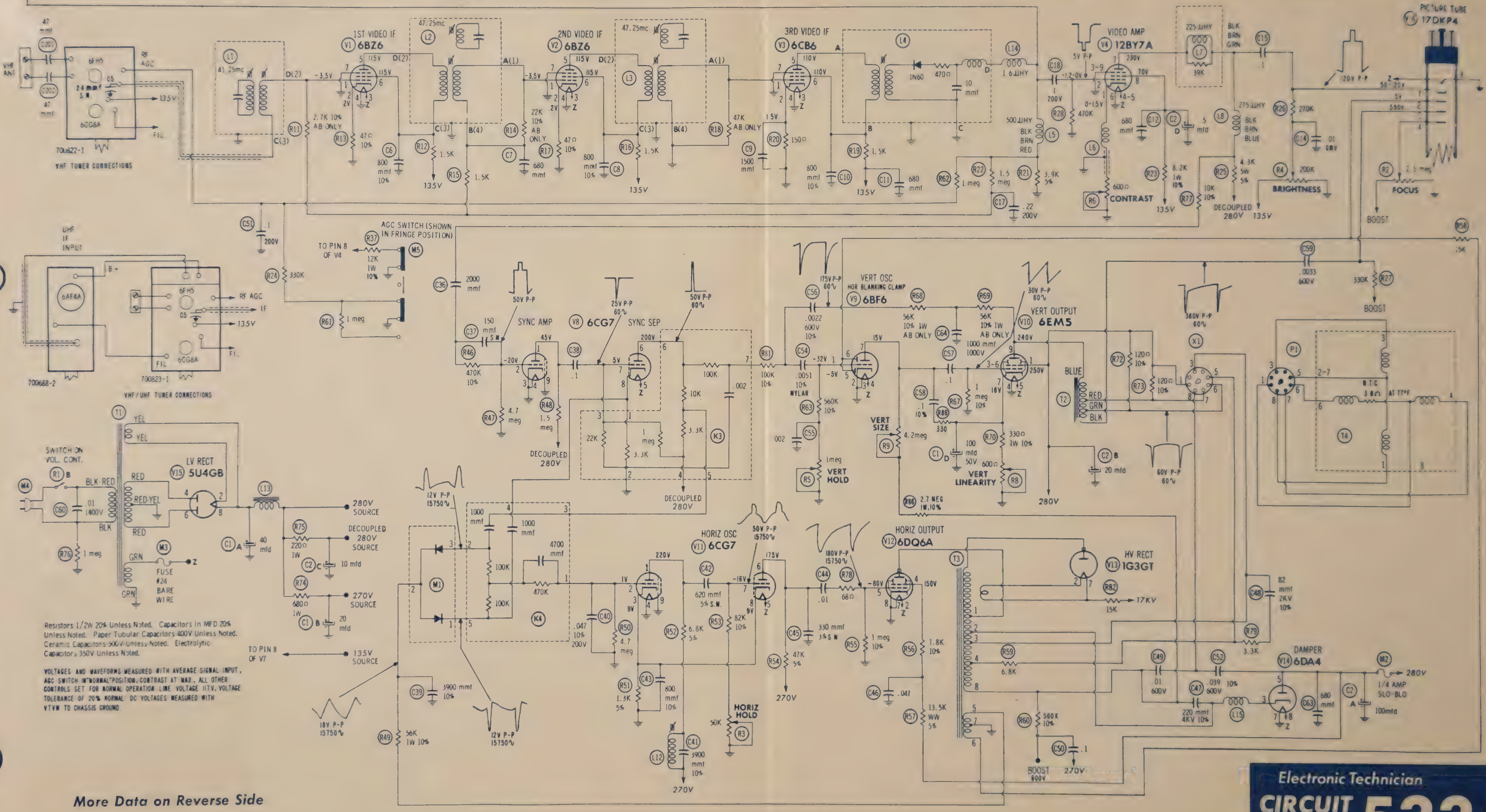
ELECTRONIC TECHNICIAN 533 CIRCUIT DIGEST

MAGNAVOX TV Chassis 32 Series


Remove 2 Screws
Remove 4 Bolts


Remove
Remove


SOUND IF
V5 6AU6
AUDIO DET
V6 6DT6
AUDIO OUTPUT
V7 6DG6GT OR 6W6GT
R1 A VOLUME 1meg
135V SOURCE
270V
280V
3.2Ω


VHF ANT
VHF TUNER CONNECTIONS
1ST VIDEO IF V1 6BZ6
2ND VIDEO IF V2 6BZ6
3RD VIDEO IF V3 6CB6
VIDEO AMP V4 12BY7A
PICTURE TUBE V16 17DKP4
CONTRAST
BRIGHTNESS
FOCUS
BOOST
UHF IF INPUT
VHF/UHF TUNER CONNECTIONS
AGC SWITCH (SHOWN IN FRINGE POSITION)
TO PIN 8 OF V4
SYNC AMP
V8 6CG7 SYNC SEP
VERT OSC HOR BLANKING CLAMP V9 6BF6
VERT OUTPUT V10 6EM5
VERT SIZE
VERT HOLD
VERT LINEARITY
SWITCH ON VOL. CONT.
LV RECT V15 5U4GB
280V SOURCE
DECOUPLED 280V SOURCE
270V SOURCE
135V SOURCE
TO PIN 8 OF V7
FUSE #24 BARE WIRE
HORIZ OSC V11 6CG7
HORIZ HOLD
HORIZ OUTPUT V12 6DQ6A
HV RECT V13 1G3GT
17KV
DAMPER V14 6DA4
1/4 AMP SLO-BLO
BOOST 600V
270V

Resistors 1/2W 20% Unless Noted. Capacitors in MFD 20% Unless Noted. Paper Tubular Capacitors 400V Unless Noted. Ceramic Capacitors 500V Unless Noted. Electrolytic Capacitors 350V Unless Noted.

VOLTAGES AND WAVEFORMS MEASURED WITH AVERAGE SIGNAL INPUT, AGC SWITCH IN "NORMAL" POSITION, CONTRAST AT MAX., ALL OTHER CONTROLS SET FOR NORMAL OPERATION LINE VOLTAGE 117V, VOLTAGE TOLERANCE OF 20% NORMAL DC VOLTAGES MEASURED WITH VTVM TO CHASSIS GROUND.

More Data on Reverse Side

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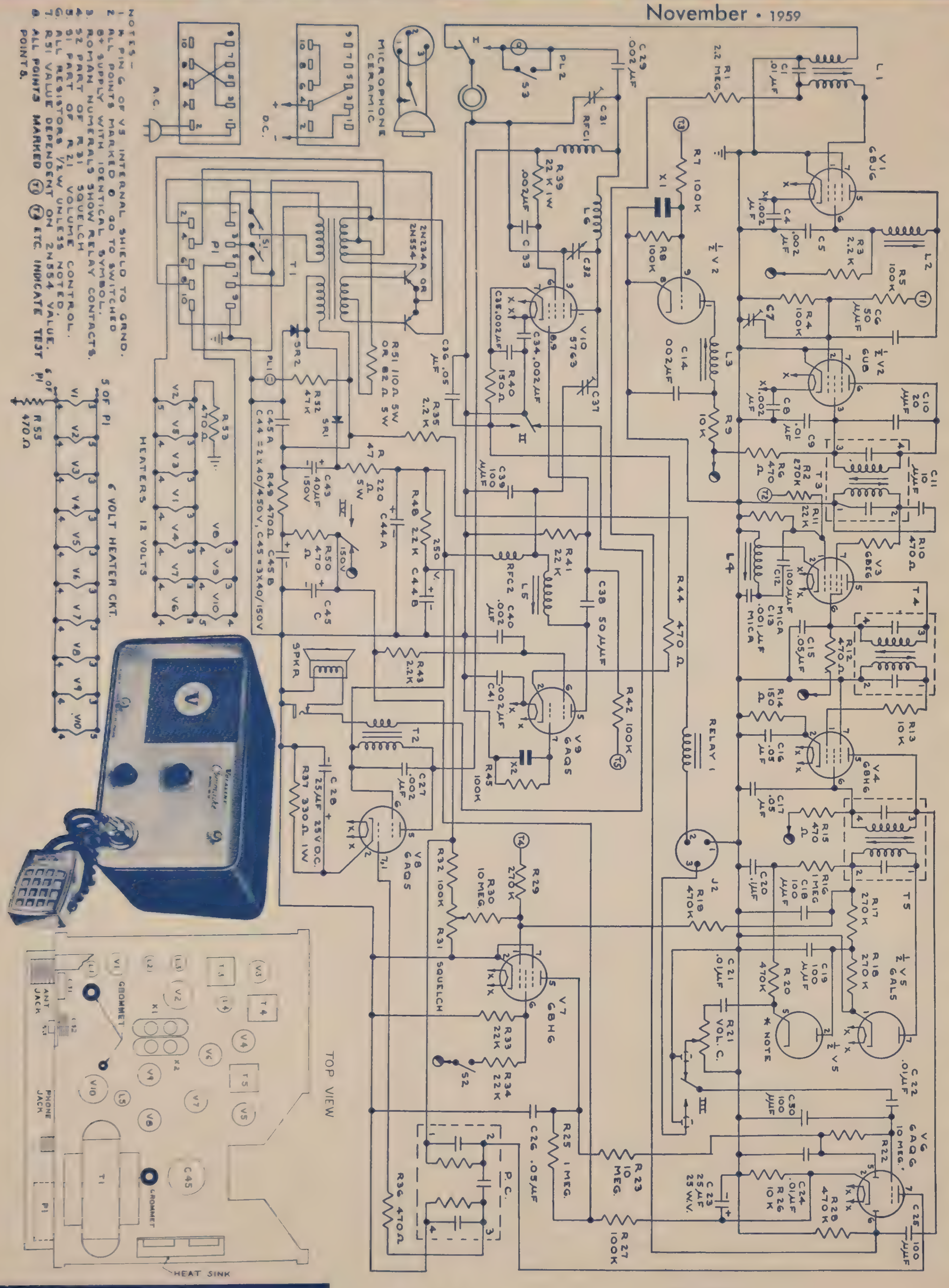
ELECTRONIC TECHNICIAN CIRCUIT DIGEST 534

VOCALINE
Citizens Band Receiver Model ED-27

November • 1959

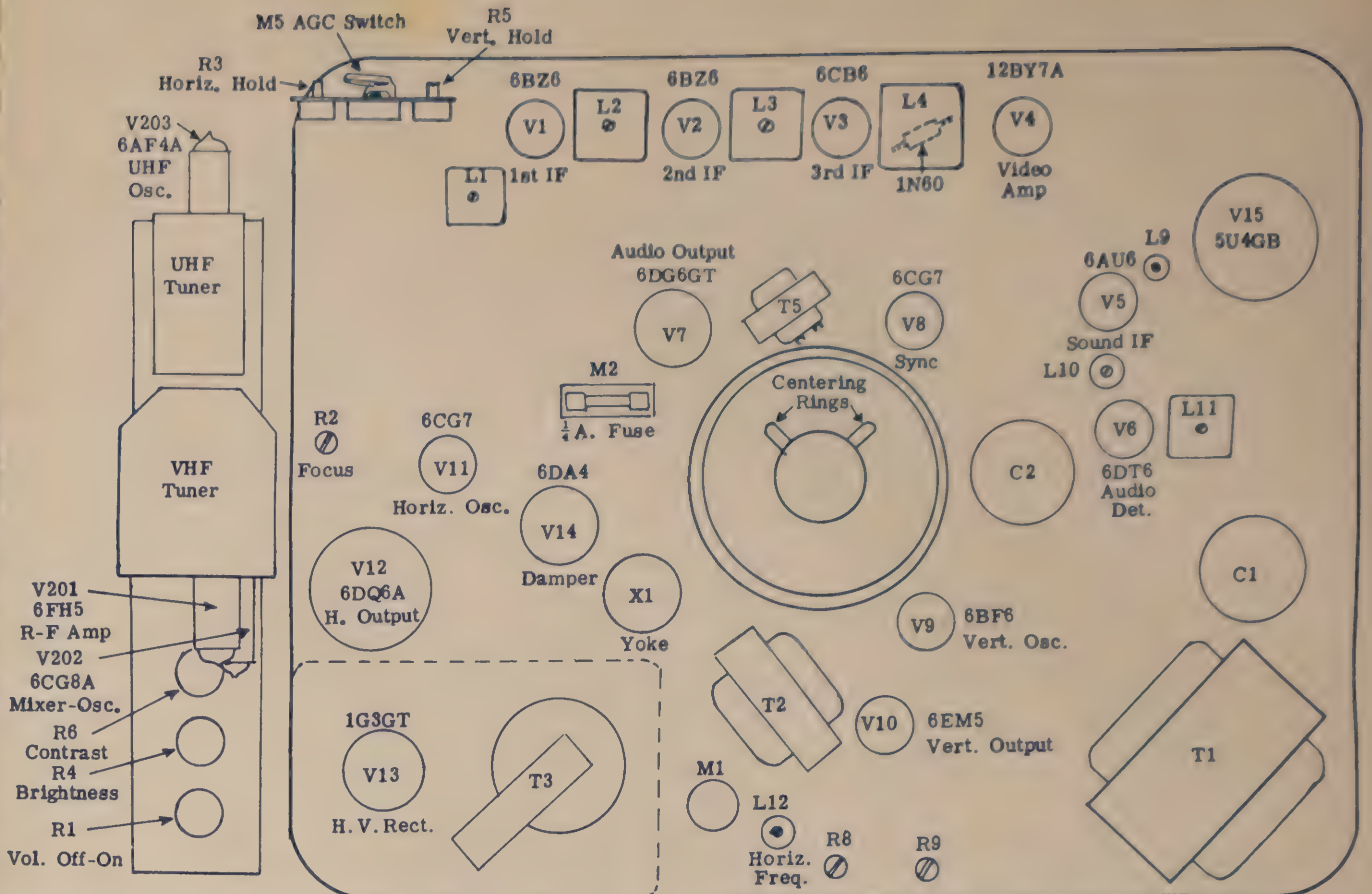

A.C.
D.C.
MICROPHONE CERAMIC
HEATERS 12 VOLTS
6 VOLT HEATER CKT.
5 OF P1
6 OF P1
R53 470Ω
SPKR.
RELAY 1
TOP VIEW
HEAT SINK
GROMMET
ANT JACK
PHONE JACK
V1 6BJ6
V2 6U8
V3 6BE6
V4 6BH6
V5 6AL5
V6 6AQ6
V7 6BH6
V8 6AQ5
V9 6AQ5
V10 5763
T1
T2
T3
T4
T5
L1
L2
L3
L4
L5
L6
S1
S2
S3
SQUELCH
VOL. C.
P.C.

NOTES–
1. * PIN 6 OF V5 INTERNAL SHIELD TO GRND.
2. ALL POINTS MARKED ⊖ GO TO SWITCHED B+ SUPPLY WITH IDENTICAL SYMBOL.
3. ROMAN NUMERALS SHOW RELAY CONTACTS.
4. S2 PART OF R31 SQUELCH
5. S1 PART OF R21 VOLUME CONTROL.
6. ALL RESISTORS ½W UNLESS NOTED.
7. R51 VALUE DEPENDENT ON 2N554 VALUE.
8. ALL POINTS MARKED Ⓣ1 Ⓣ2 ETC. INDICATE TEST POINTS.

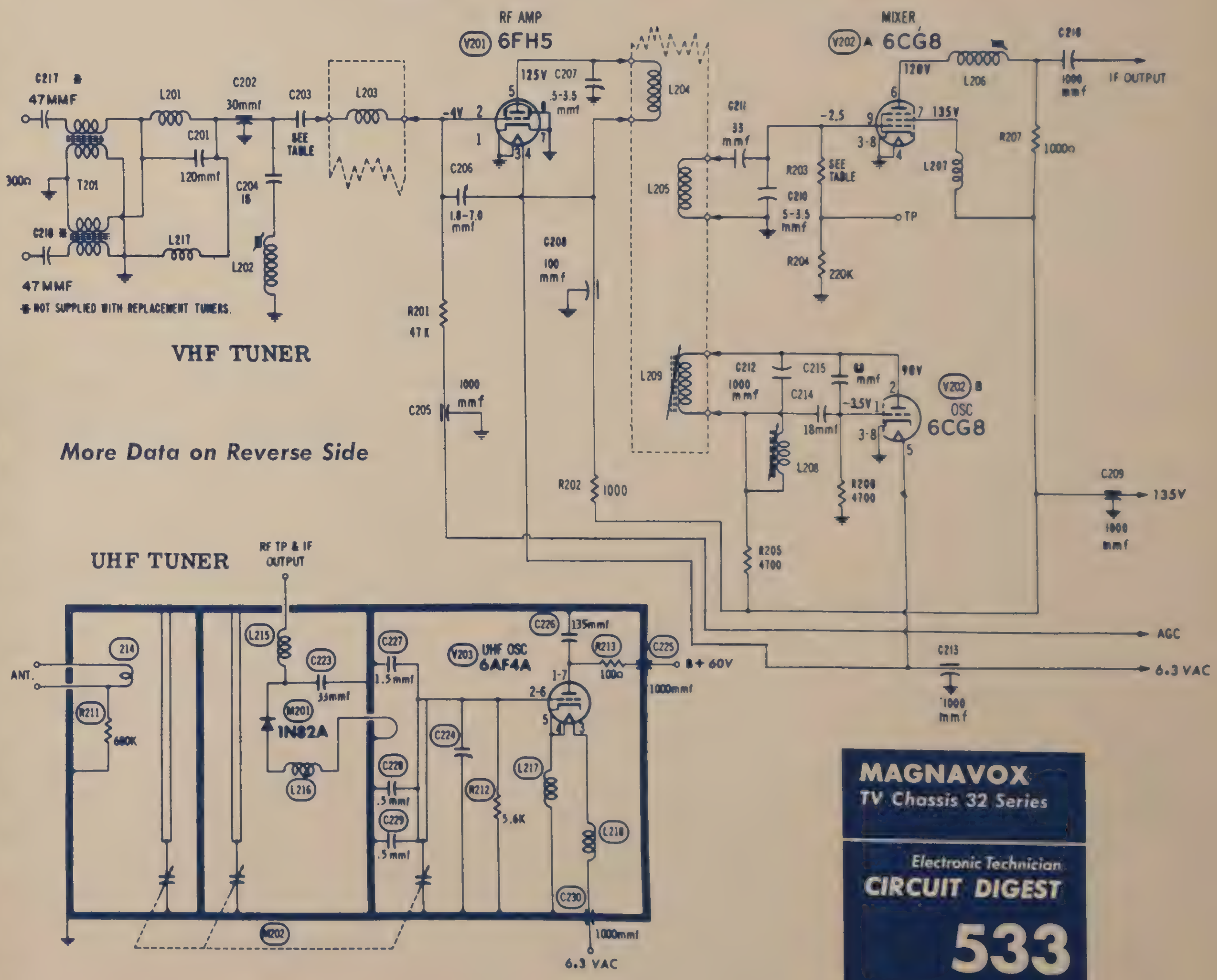
V1 — 6BJ6
V2 — 6U8
V3 — 6BE6
V4, V7 — 6BH6
V5 — 6AL5
V6 — 6AQ6
V8, V9 — 6AQ5
V10 — 5763

WARNING

If it is necessary to remove the chassis from the cabinet for any reason, be extremely careful not to disturb the copper coil located in front of C-31 and C-32. This coil is adjusted at the factory and performance will be substantially reduced if it is disturbed in any way.


M5 AGC Switch
R5 Vert. Hold
R3 Horiz. Hold
V203 6AF4A UHF Osc.
UHF Tuner
VHF Tuner
V201 6FH5 R-F Amp
V202 6CG8A Mixer-Osc.
R6 Contrast
R4 Brightness
R1 Vol. Off-On
6BZ6 V1 1st IF
6BZ6 V2 2nd IF
6CB6 V3 3rd IF
12BY7A V4 Video Amp
L1
L2
L3
L4
1N60
V15 5U4GB
L9
6AU6 V5 Sound IF
L10
V6 6DT6 Audio Det.
L11
Audio Output 6DG6GT V7
T5
6CG7 V8 Sync
M2 ¼A. Fuse
Centering Rings
R2 Focus
6CG7 V11 Horiz. Osc.
6DA4 V14 Damper
V12 6DQ6A H. Output
X1 Yoke
C2
C1
V9 6BF6 Vert. Osc.
1G3GT V13 H. V. Rect.
T3
T2
V10 6EM5 Vert. Output
M1
L12 Horiz. Freq.
R8 Vert. Lin.
R9 Vert. Size
T1

CHASSIS LAYOUT


RF AMP
V201 6FH5
MIXER
V202 A 6CG8
C217 47MMF
300Ω
T201
C218 47MMF
* NOT SUPPLIED WITH REPLACEMENT TUNERS.
L201
C201 120mmf
C202 30mmf
C203 SEE TABLE
L203
C204 15
L217
L202
125V
C207 5-3.5 mmf
L204
C206 1.8-7.0 mmf
C208 100 mmf
R201 47K
C205 1000 mmf
R202 1000
C211 33 mmf
L205
R203 SEE TABLE
C210 5-3.5 mmf
TP
R204 220K
128V
L206
-2.5
135V
L207
R207 1000Ω
C216 1000 mmf
IF OUTPUT
L209
C212 1000 mmf
C215 6 mmf
C214 18mmf
L208
R208 4700
98V
V202 B OSC 6CG8
R205 4700
C209 1000 mmf
135V
AGC
C213 1000 mmf
6.3 VAC
RF TP & IF OUTPUT
ANT.
214
R211 680K
L215
C223 35mmf
M201 1N82A
L216
C227 1.5mmf
V203 UHF OSC 6AF4A
C226 135mmf
R213 100Ω
C225 1000mmf
B+ 60V
C224
C228 .5mmf
C229 .5mmf
R212 5.6K
L217
L218
C230 1000mmf
6.3 VAC
M202

VHF TUNER

UHF TUNER

More Data on Reverse Side

MAGNAVOX
TV Chassis 32 Series

Electronic Technician CIRCUIT DIGEST 533

An Editorial Service of ELECTRONIC TECHNICIAN, INC. ☆ 480 Lexington Ave., New York 17, N.Y.

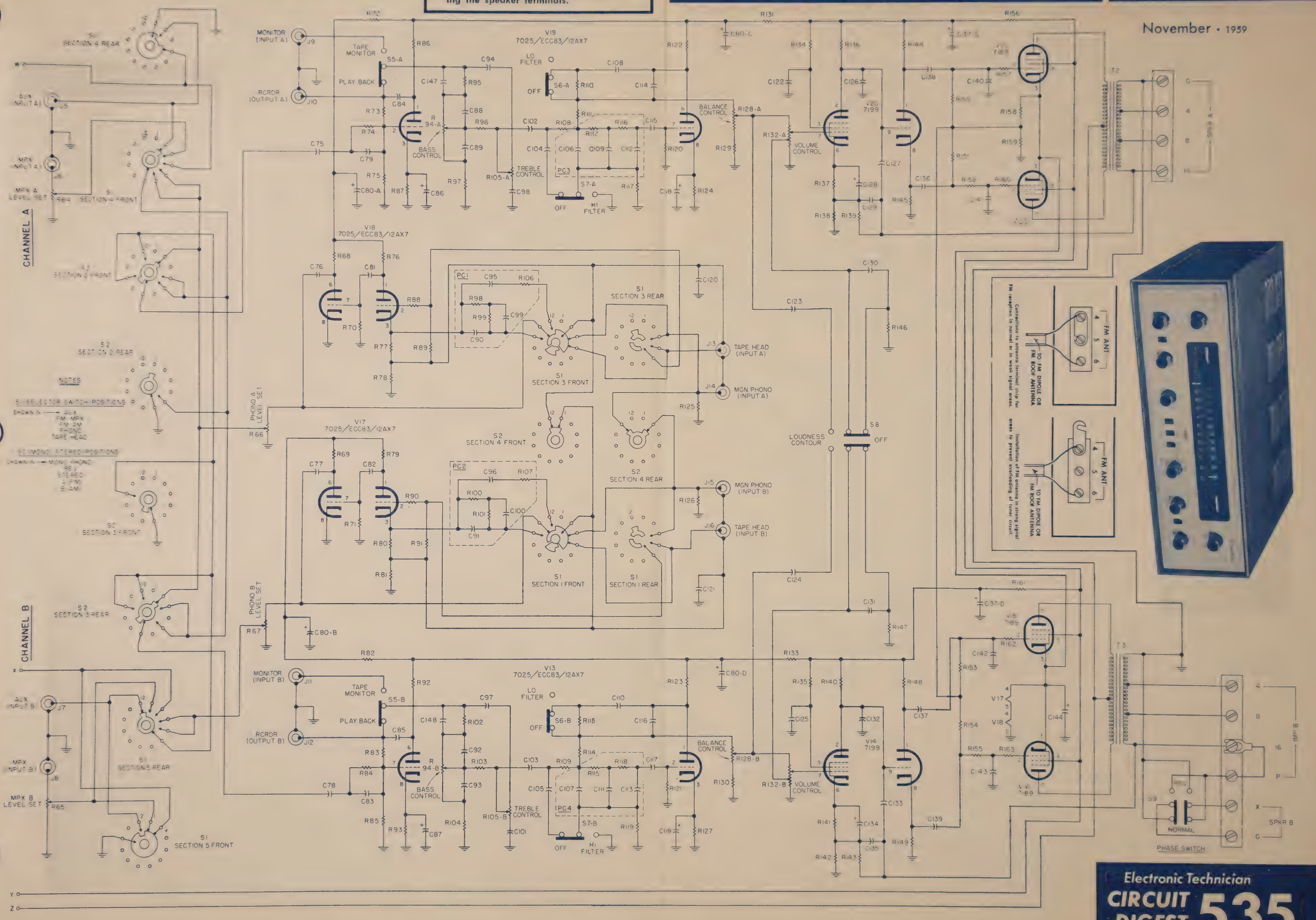
ELECTRONIC TECHNICIAN CIRCUIT DIGEST 535

FISHER
FM-AM Stereo Receiver Model 600

November • 1959

AMPLIFIER SECTION

Important! **Do not attempt to operate the *TA-600* Receiver without first connecting both speakers or otherwise loading the speaker terminals.**



CHANNEL A
CHANNEL B
MONITOR (INPUT A) J9
RCRDR (OUTPUT A) J10
TAPE MONITOR
S5-A
PLAY BACK
AUX INPUT A J5
MPX INPUT A J6
MPX A LEVEL SET R64
S1 SECTION 4 REAR
S1 SECTION 4 FRONT
S2 SECTION 2 FRONT
S2 SECTION 2 REAR
V19 7025/ECC83/12AX7
V18 7025/ECC83/12AX7
V17 7025/ECC83/12AX7
V13 7025/ECC83/12AX7
BASS CONTROL
TREBLE CONTROL
LO FILTER
HI FILTER
OFF
S6-A
S7-A
PC1
PC2
PC3
PC4
BALANCE CONTROL
VOLUME CONTROL
R128-A
R132-A
7199
7189
T2
T3
G
4
8
16
SPKR A
SPKR B
S1 SECTION 3 REAR
S1 SECTION 3 FRONT
TAPE HEAD (INPUT A) J13
MGN PHONO (INPUT A) J14
PHONO A LEVEL SET R66
NOTES
S1 SELECTOR SWITCH POSITIONS SHOWN IN AUX FM-MPX FM-AM PHONO TAPE HEAD
S2 MONO-STEREO POSITIONS SHOWN IN MONO-PHONO REV STEREO A (FM) B (AM)
S2 SECTION 4 FRONT
S2 SECTION 4 REAR
S2 SECTION 3 FRONT
LOUDNESS CONTOUR
S8
OFF
MGN PHONO (INPUT B) J15
TAPE HEAD (INPUT B) J16
S1 SECTION 1 FRONT
S1 SECTION 1 REAR
PHONO B LEVEL SET R67
S2 SECTION 3 REAR
MONITOR (INPUT B) J11
RCRDR (OUTPUT B) J12
S5-B
S6-B
S7-B
R128-B
R132-B
V14 7199
V15 7189
V16 7189
AUX INPUT B J7
MPX INPUT B J8
MPX B LEVEL SET R65
S1 SECTION 5 REAR
S1 SECTION 5 FRONT
PHASE SWITCH
S9
NORMAL
P
X
Y
Z
W
FM ANT
4
5
6
TO FM DIPOLE OR FM ROOF ANTENNA

Connections to antenna terminal strip for FM reception in normal or in weak signal areas.

Installation of FM antenna in strong signal areas to prevent overloading of tuner circuit.

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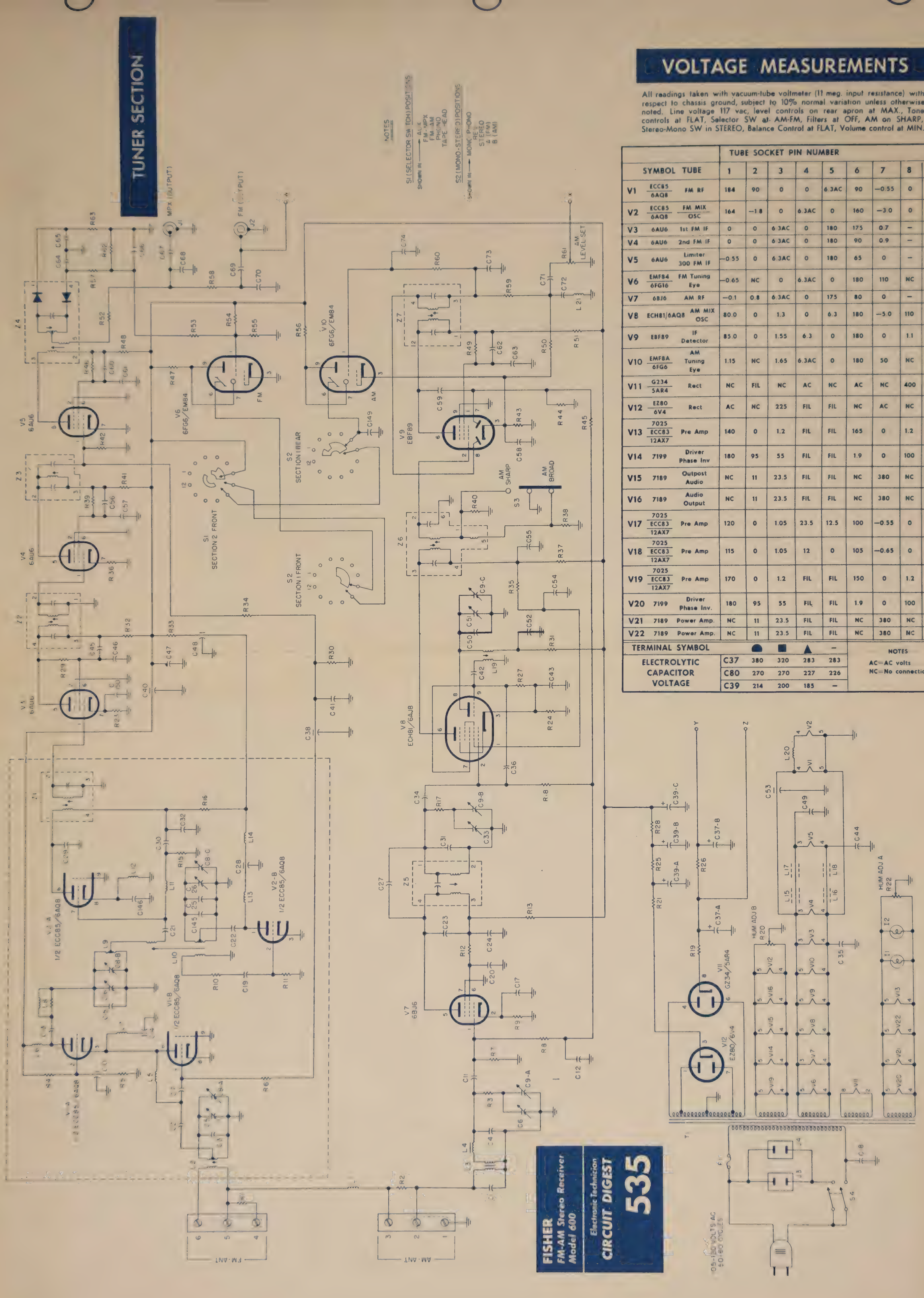
More Data on Reverse Side

FISHER
FM-AM Stereo Receiver
Model 600

Electronic Technician
CIRCUIT DIGEST
535


TUNER SECTION
FM-ANT
AM-ANT
V1-A 1/2 ECC85/6AQ8
V1-B 1/2 ECC85/6AQ8
V2-A 1/2 ECC85/6AQ8
V2-B 1/2 ECC85/6AQ8
V3 6AU6
V4 6AU6
V5 6AU6
V6 6FG6/EM84
V7 6BJ6
V8 ECH81/6AJ8
V9 EBF89
V10 6FG6/EM84
V11 GZ34/5AR4
V12 EZ80/6V4
Z1
Z2
Z3
Z4
Z5
Z6
Z7
MPX (OUTPUT) J1
FM (OUTPUT) J2
S1 SECTION 2 FRONT
S2 SECTION 1 FRONT
S2 SECTION 1 REAR
FM
AM
AM SHARP
S3
AM BROAD
AM LEVEL SET
HUM ADJ B R20
HUM ADJ A R22
105-120 VOLTS AC 50-60 CYCLES
F1
J3
J4
S4
T1
Y
Z
NOTES
S1 (SELECTOR SWITCH) POSITIONS
SHOWN IN → AUX
FM-MPX
FM-AM
PHONO
TAPE HEAD
S2 (MONO-STEREO) POSITIONS
SHOWN IN → MONO PHONO
REV
STEREO
A (FM)
B (AM)

VOLTAGE MEASUREMENTS

All readings taken with vacuum-tube voltmeter (11 meg. input resistance) with respect to chassis ground, subject to 10% normal variation unless otherwise noted. Line voltage 117 vac, level controls on rear apron at MAX., Tone controls at FLAT, Selector SW at AM-FM, Filters at OFF, AM on SHARP, Stereo-Mono SW in STEREO, Balance Control at FLAT, Volume control at MIN.

SYMBOL	TUBE		TUBE SOCKET PIN NUMBER								
			1	2	3	4	5	6	7	8	9
V1	ECC85 6AQ8	FM RF	184	90	0	0	6.3AC	90	−0.55	0	0
V2	ECC85 6AQ8	FM MIX OSC	164	−1.8	0	6.3AC	0	160	−3.0	0	0
V3	6AU6	1st FM IF	0	0	6.3AC	0	180	175	0.7	–	–
V4	6AU6	2nd FM IF	0	0	6.3AC	0	180	90	0.9	–	–
V5	6AU6	Limiter 300 FM IF	−0.55	0	6.3AC	0	180	65	0	–	–
V6	EMF84 6FG16	FM Tuning Eye	−0.65	NC	0	6.3AC	0	180	110	NC	110
V7	6BJ6	AM RF	−0.1	0.8	6.3AC	0	175	80	0	–	–
V8	ECH81/6AQ8	AM MIX OSC	80.0	0	1.3	0	6.3	180	−5.0	110	−5.0
V9	EBF89	IF Detector	85.0	0	1.55	6.3	0	180	0	1.1	0
V10	EMF8A 6FG6	AM Tuning Eye	1.15	NC	1.65	6.3AC	0	180	50	NC	50
V11	G234 5AR4	Rect	NC	FIL	NC	AC	NC	AC	NC	400	–
V12	EZ80 6V4	Rect	AC	NC	225	FIL	FIL	NC	AC	NC	NC
V13	7025 ECC83 12AX7	Pre Amp	140	0	1.2	FIL	FIL	165	0	1.2	FIL
V14	7199	Driver Phase Inv	180	95	55	FIL	FIL	1.9	0	100	90
V15	7189	Outpost Audio	NC	11	23.5	FIL	FIL	NC	380	NC	320
V16	7189	Audio Output	NC	11	23.5	FIL	FIL	NC	380	NC	320
V17	7025 ECC83 12AX7	Pre Amp	120	0	1.05	23.5	12.5	100	−0.55	0	NC
V18	7025 ECC83 12AX7	Pre Amp	115	0	1.05	12	0	105	−0.65	0	NC
V19	7025 ECC83 12AX7	Pre Amp	170	0	1.2	FIL	FIL	150	0	1.2	FIL
V20	7199	Driver Phase Inv.	180	95	55	FIL	FIL	1.9	0	100	95
V21	7189	Power Amp.	NC	11	23.5	FIL	FIL	NC	380	NC	320
V22	7189	Power Amp.	NC	11	23.5	FIL	FIL	NC	380	NC	320

TERMINAL SYMBOL		◖	■	▲	–
ELECTROLYTIC CAPACITOR VOLTAGE	C37	380	320	283	283
	C80	270	270	227	226
	C39	214	200	185	–

NOTES
AC=AC volts
NC=No connection

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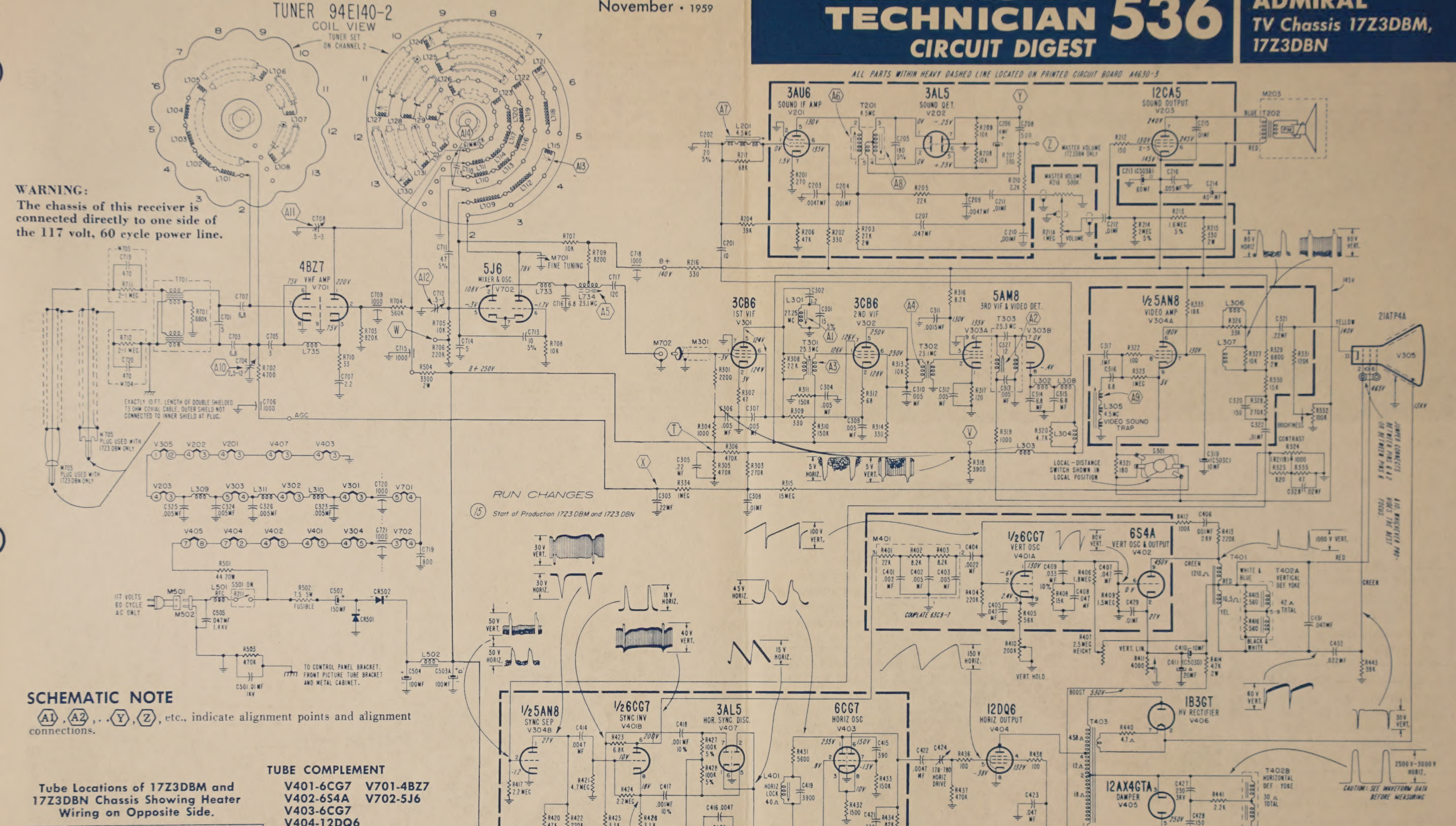
ELECTRONIC TECHNICIAN 536
CIRCUIT DIGEST

ADMIRAL
TV Chassis 17Z3DBM, 17Z3DBN

November • 1959

WARNING: The chassis of this receiver is connected directly to one side of the 117 volt, 60 cycle power line.


ALL PARTS WITHIN HEAVY DASHED LINE LOCATED ON PRINTED CIRCUIT BOARD A4630-3
TUNER 94E140-2
COIL VIEW
TUNER SET ON CHANNEL 2
4BZ7 VHF AMP V701
5J6 MIXER & OSC. V702
M701 FINE TUNING
EXACTLY 10 FT. LENGTH OF DOUBLE SHIELDED 75 OHM COAXIAL CABLE, OUTER SHIELD NOT CONNECTED TO INNER SHIELD AT PLUG.
M705 PLUG USED WITH 17Z3DBN ONLY
AGC
B+ 250V
3AU6 SOUND IF AMP V201
3AL5 SOUND DET. V202
12CA5 SOUND OUTPUT V203
T201 4.5MC
MASTER VOLUME 17Z3DBN ONLY
VOLUME
M203
3CB6 1ST VIF V301
3CB6 2ND VIF V302
5AM8 3RD VIF & VIDEO DET. V303A, V303B
½ 5AN8 VIDEO AMP V304A
21ATP4A V305
BRIGHTNESS
CONTRAST
LOCAL-DISTANCE SWITCH SHOWN IN LOCAL POSITION
VIDEO SOUND TRAP
RUN CHANGES
⑮ Start of Production 17Z3DBM and 17Z3DBN
117 VOLTS 60 CYCLE AC ONLY
FUSIBLE
TO CONTROL PANEL BRACKET, FRONT PICTURE TUBE BRACKET AND METAL CABINET.
½6CG7 VERT OSC V401A
6S4A VERT OSC & OUTPUT V402
M401
COUPLATE 63C9-7
VERT HOLD
HEIGHT
VERT. LIN.
T402A VERTICAL DEF YOKE
½5AN8 SYNC SEP V304B
½6CG7 SYNC INV V401B
3AL5 HOR. SYNC. DISC. V407
6CG7 HORIZ OSC V403
HORIZ LOCK
HORIZ DRIVE
12DQ6 HORIZ OUTPUT V404
1B3GT HV RECTIFIER V406
12AX4GTA DAMPER V405
T403
T402B HORIZONTAL DEF YOKE
CAUTION: SEE WAVEFORM DATA BEFORE MEASURING

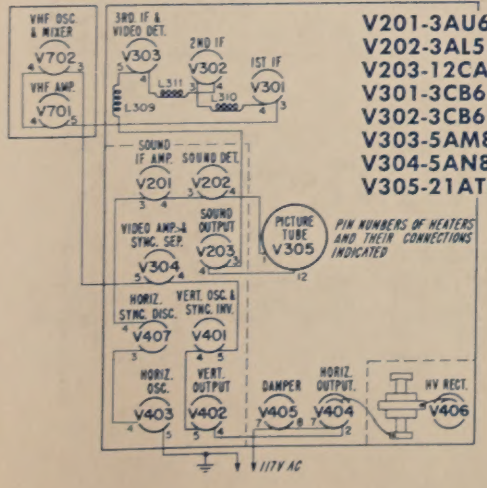
SCHEMATIC NOTE

Ⓐ1, Ⓐ2, . . Ⓨ, Ⓩ, etc., indicate alignment points and alignment connections.

TUBE COMPLEMENT

V201-3AU6
V202-3AL5
V203-12CA5
V301-3CB6
V302-3CB6
V303-5AM8
V304-5AN8
V305-21ATP4A
V401-6CG7
V402-6S4A
V403-6CG7
V404-12DQ6
V405-12AX4GTA
V406-1B3GT
V407-3AL5 or
CR401-Dual Selenium Diode 93A5-4
V701-4BZ7
V702-5J6

Tube Locations of 17Z3DBM and 17Z3DBN Chassis Showing Heater Wiring on Opposite Side.


VHF OSC. & MIXER
V702
VHF AMP.
V701
3RD IF & VIDEO DET.
V303
2ND IF
V302
1ST IF
V301
L309
L311
L310
SOUND
IF AMP.
V201
SOUND DET.
V202
VIDEO AMP. & SYNC. SEP.
V304
SOUND OUTPUT
V203
PICTURE TUBE
V305
PIN NUMBERS OF HEATERS AND THEIR CONNECTIONS INDICATED
HORIZ. SYNC. DISC.
V407
VERT. OSC. & SYNC. INV.
V401
HORIZ. OSC.
V403
VERT. OUTPUT
V402
DAMPER
V405
HORIZ. OUTPUT
V404
HV RECT.
V406
117V AC

PRODUCTION CHANGES:

HORIZONTAL SYNC DISCRIMINATOR REPLACED WITH 3AL5 TUBE

Run 12

To provide a more stable horizontal circuit, CR401 (93B5-4) was replaced with a 3AL5 tube. The tube socket was added to the printed wiring board in the same position.

No changes in the etched foil were required. A jumper (shorting) wire was removed from across the two circuits representing the heater terminals.

TO PREVENT RADIATION INTERFERENCE, CHOKE COIL ADDED TO VIDEO DETECTOR CIRCUIT

Run 13

In keeping with the television industries practice of complying with FCC regulations for reduced radiation interference, a self resonant choke coil (L308) was inserted into the video detector plate circuit, between L302 and L304.

CHANGE TO IMPROVE VIDEO RESPONSE AND CONTRAST

Run 14

To improve video response, C318 (.005 mf) screen bypass capacitor deleted; R333 (3,900 ohms) video amplifier screen resistor changed to 18,000 ohms; R329 (5,600 ohms) video amplifier plate dropping resistor changed to 6,800 ohms; and R318 (5,600 ohms) video detector load resistor changed to 3,900 ohms.

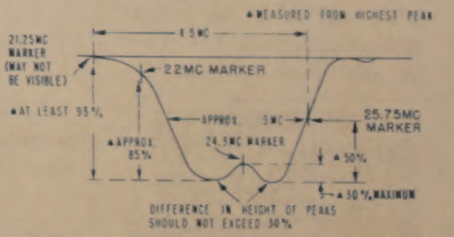
To improve the contrast, R335 (47 ohms) and C328 (.02 mf) added across the low side of the contrast control circuit.

VERTICAL BLANKING COUPLATE REPLACED BY SEPARATE COMPONENTS. SPEAKER PLUG AND SOCKET DELETED.

Run 15

To simplify circuitry, the vertical blanking couplate, M402 (used to supply a vertical blanking pulse to grid of V305), replaced by individual components. C431 (.047 mf) connected across vertical section of yoke (T402A). R443 (39,000 ohms) connected from pin 2 (V305) to chassis ground; and C432 (.022 mf) connected from pin 2 (V305) to junction of C431 and T402A. The speaker plug (M202) and socket (M201) deleted and speaker output leads wired-in to a terminal strip mounted on the chassis.

Ideal IF Response Curve.



Electronic Technician
CIRCUIT DIGEST 536

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More Data on Reverse Side

November • 1959

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CIRCUIT DIGESTS

87

In This Issue (No. 87)

Circuit Digest No.

ADMIRAL 536
TV Chassis 17Z3DBM, 17Z3DBN
Models T23A1BM, T23A1BM-1

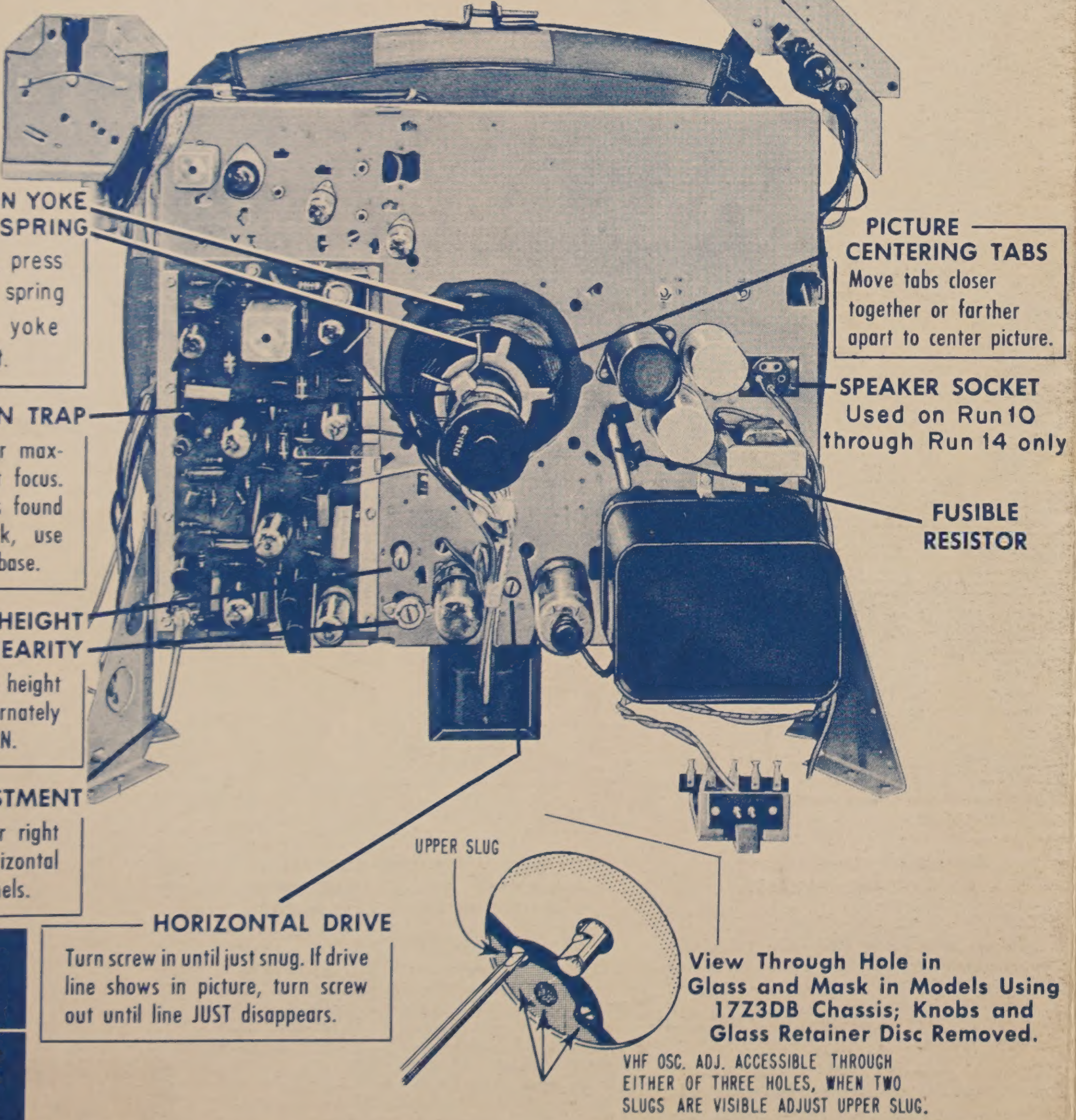
FISHER 535
FM-AM Stereo Receiver Model 600

MAGNAVOX 533
TV Chassis 32 Series

PHILCO 532
TV Chassis 10H25, 10H25U, 10H25R

VOCALINE 534
Citizens Band Transceiver
Model ED-27

Rear View of Chassis Showing Adjustments.



DEFLECTION YOKE

YOKE RETAINING SPRING

To correct picture tilt, press ends of yoke retaining spring together while rotating yoke until picture is straight.

ION TRAP

VERY CAREFULLY adjust for maximum brightness and best focus. If maximum brightness is found in two positions on neck, use position closest to tube base.

HEIGHT

VERTICAL LINEARITY

To correct improper picture height or vertical linearity, alternately adjust HEIGHT and VERT. LIN.

HORIZONTAL ADJUSTMENT

Rotate shaft to the left or right until picture remains in horizontal sync when switching channels.

HORIZONTAL DRIVE

Turn screw in until just snug. If drive line shows in picture, turn screw out until line JUST disappears.

PICTURE CENTERING TABS

Move tabs closer together or farther apart to center picture.

SPEAKER SOCKET

Used on Run 10 through Run 14 only

FUSIBLE RESISTOR

View Through Hole in Glass and Mask in Models Using 17Z3DB Chassis; Knobs and Glass Retainer Disc Removed.

VHF OSC. ADJ. ACCESSIBLE THROUGH EITHER OF THREE HOLES. WHEN TWO SLUGS ARE VISIBLE ADJUST UPPER SLUG.

ADMIRAL
TV Chassis 17Z3DBM, 17Z3DBN

Electronic Technician
CIRCUIT DIGEST
536

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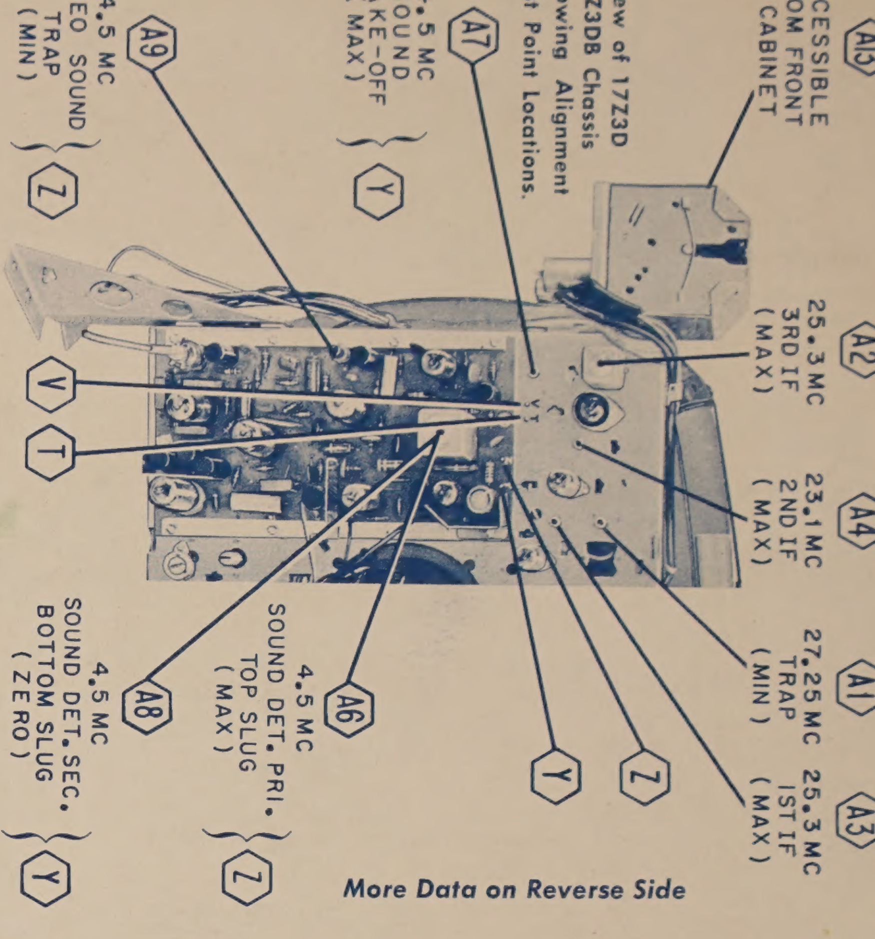
ADMIRAL
TV Chassis 17Z3DBM, 17Z3DBN

Electronic Technician
CIRCUIT DIGEST
536

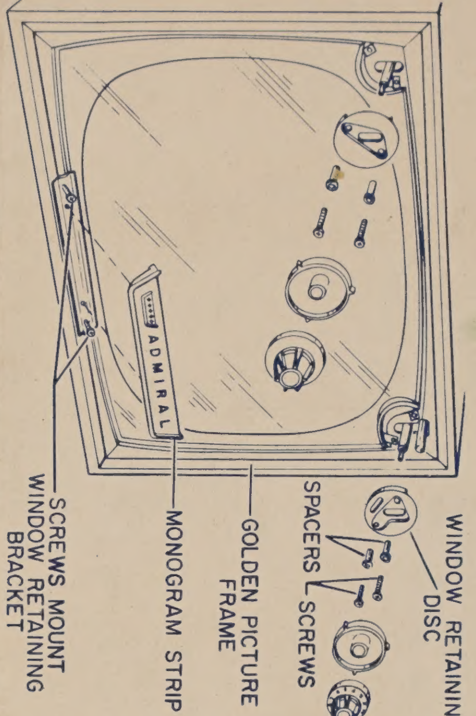
Rear View of 17Z3D and 17Z3DB Chassis Showing Alignment and Test Point Locations.



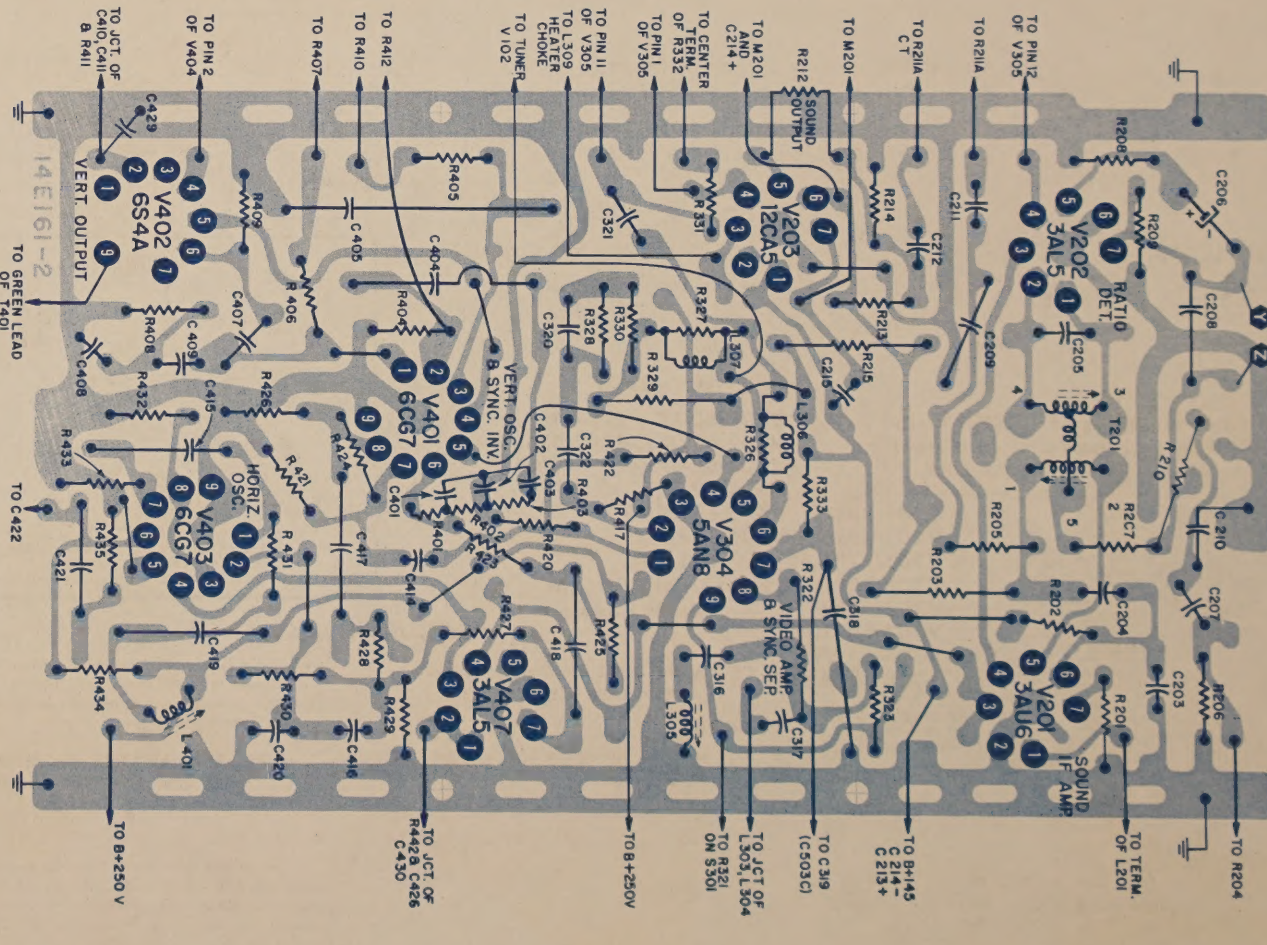
A13
ACCESSIBLE FROM FRONT OF CABINET
A7
4.5 MC SOUND TAKE-OFF (MAX)
Y
A9
4.5 MC VIDEO SOUND TRAP (MIN)
Z
V
T
A2
25.3 MC 3RD IF (MAX)
A4
23.1 MC 2ND IF (MAX)
A1
27.25 MC TRAP (MIN)
A3
25.3 MC 1ST IF (MAX)
Z
Y
A6
4.5 MC SOUND DET. PRI. TOP SLUG (MAX)
Z
A8
4.5 MC SOUND DET. SEC. BOTTOM SLUG (ZERO)
Y

More Data on Reverse Side

Removing Picture Window in Models with "Golden" Picture Frame.



WINDOW RETAINING DISC
SPACERS
SCREWS
GOLDEN PICTURE FRAME
MONOGRAM STRIP
SCREWS MOUNT WINDOW RETAINING BRACKET
ADMIRAL



14E161-2
V402 6S4A VERT. OUTPUT
V401 6CG7 VERT. OSC. B SYNC. INV.
V403 6CG7 HORIZ OSC.
V407 3AL5
V203 12CA5 SOUND OUTPUT
V304 5AN8 VIDEO AMP B SYNC. SEP
V202 3AL5 RATIO DET.
V201 3AU6 SOUND IF AMP
T201
L401
L306
L305
TO PIN 12 OF V305
TO R211A
TO R211A CT
TO M201
TO M201 AND C214+
TO CENTER TERM. OF R332
TO PIN 1 OF V305
TO PIN 11 OF V305
TO L309 HEATER CHOKE
TO TUNER V102
TO R412
TO R410
TO R407
TO PIN 2 OF V404
TO JCT OF C410, C411 & R411
TO GREEN LEAD OF T401
TO C422
TO B+250 V
TO JCT OF R428, C426 C430
TO B+250V
TO JCT OF L303, L304
TO R321 ON S301
TO C319 (C503C)
TO B+145 C214+ C213+
TO TERM. OF L201
TO R204

View of Printed Wiring Side of Later Production Printed Wiring Board (A4630-3) Showing Components and Connections on Opposite Side.

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THE WHOLE MULTI-MILLION DOLLAR MARKET HAS HEARD THAT

ASTATIC PLUG-IN CARTRIDGES

ARE THE ONLY COMPLETE LINE THAT MEETS EVERY SALES OPPORTUNITY

AS EASY AS CHANGING A LIGHT BULB
. . . NO INSTALLATION OR SERVICE PROBLEMS

You've had the message by now—that millions of plug-in phono cartridges have already been sold . . . that Astatic Plug ins represent a tremendous multi-million dollar replacement market . . . and that THE ONLY COMPLETE, SINGLE SOURCE PLUG-IN LINE ON THE MARKET IS ASTATIC'S!

So why not use the message? Act now to cash in on this RICH and SKY-ROCKETING MARKET. Get into the plug-in business and get into it all the way—never missing a single sale—with THE COMPLETE ASTATIC PLUG-IN LINE.

EASY, AUTOMATIC SALES WITH ASTATIC MERCHANDISING PACKAGE

You sell from this plastic display-merchandiser which is pilfer-proof, holds an assortment of a dozen cartridges. Information under each cartridge tells the customer which model he needs. Colorful, attractive window card —free of charge—tells 'em you've got 'em!

CALL YOUR DISTRIBUTOR OR WRITE FOR FULL DETAILS

ASTATIC
PLUG-IN

THE Astatic CORPORATION, CONNEAUT, OHIO — KNOWN THE WORLD OVER
IN CANADA: CANADIAN ASTATIC LIMITED,
TORONTO, ONTARIO
EXPORT SALES: ROBURN AGENCIES INC.,
431 GREENWICH ST., N. Y. 13, N. Y., U. S. A.

GO BY BRAND
—GO BUY ASTATIC

A MODEL FOR EVERY APPLICATION — STEREO OR MONAURAL — DIAMOND OR SAPPHIRE TIP

DIRECT-DRIVE and 6CD6-GA

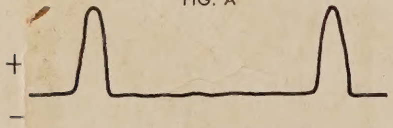
6DQ6-A
RCA ELECTRON TUBE
RCA
6DQ6 A
ELECTRON TUBE
RADIOTRON

Here's how you can get better service from the 6CD6-GA!

Have you had difficulties with 6CD6-GA's operating in direct-drive circuits? If so, this message is most important to you. Here's a simple way to "lick" the problem.

In horizontal-output circuits utilizing transformer or auto-transformer coupling to the deflecting yoke the damper tube is usually connected across a portion of the flyback transformer, and acts to reduce "ringing" after each flyback pulse.

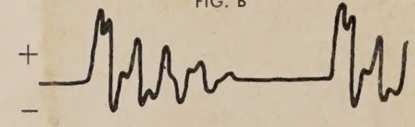
FIG. A



Waveform of flyback pulse at the plate of horizontal-output tube in a typical transformer-coupled circuit.

In most direct-drive circuits, those in which the horizontal coils of the deflecting yoke are connected in series with the horizontal-output transformer, the damper tube is not connected across any portion of the high-voltage transformer. Therefore, high-amplitude "ringing" voltage may be present. Should the negative peaks of the "ringing" voltage exceed the maximum plate-voltage rating of the horizontal-output tube, the tube may be damaged. Thus, premature failure of a horizontal-output tube may occur because of improper conditions.

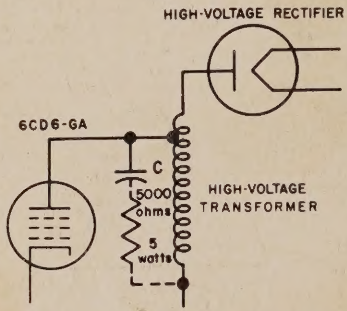
FIG. B



Waveform at the plate of horizontal-output tube in a typical direct-drive circuit.

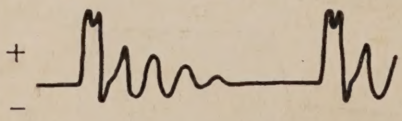
Possibilities of premature failure of the popular 6CD6-GA when used in direct-drive circuits can be reduced by lowering the negative peaks of the flyback pulse. This is done very simply as shown below in Fig. C. Add a 5,000-ohm 5-watt resistor in series with "C". ("C" is part of the existing circuit, usually about 33μμf).

FIG. C



Typical direct-drive circuit, with 5,000-ohm 5-watt resistor to be added shown in broken line. To provide adequate ventilation and H-V insulation, the resistor should be spaced away from other parts, wires, shields, etc.

FIG. D

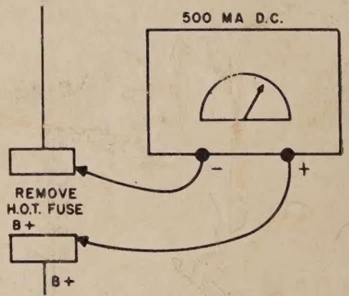


Waveform at the plate of horizontal-output tube in a typical direct-drive circuit with added 5,000-ohm 5-watt resistor. The resistor lowers the "Q" of the transformer to reduce the amplitude of the "ringing" voltage.

CORRECT HORIZONTAL ADJUSTMENTS ARE IMPORTANT!

Incorrect setting of the horizontal-drive and linearity controls can cause excessive cathode current. To assure long life of the 6CD6-GA, measure its cathode current, and adjust drive and linearity controls for lowest current consistent with linearity. To measure cathode current in the RCA Victor KCS-68 and KCS-81, and other chassis utilizing similar direct-drive horizontal-output circuits, simply remove the B+ fuse and connect a dc milliammeter across the fuse holder, as shown in Fig. E.

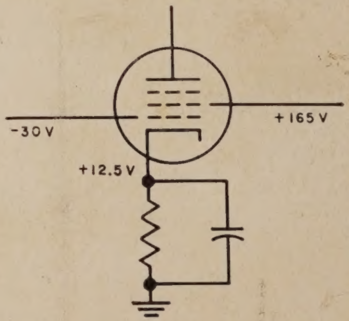
FIG. E



VOLTAGES ARE IMPORTANT, TOO!

Check screen-grid, cathode, and control-grid voltages. If the control-grid voltage is low, check waveform and amplitude of the sawtooth driving voltage at the control grid. Make horizontal-oscillator circuit adjustments, if necessary. Check B+ and line voltages.

FIG. F



Typical operating voltages of a 6CD6-GA horizontal-output tube in the direct-drive circuits used in the RCA Victor KCS-68 and KCS-81 chassis, measured to chassis ground, with an RCA VoltOhmyst®.

RCA-6CD6-GA TUBES ARE DYNAMICALLY CHECKED IN DIRECT-DRIVE CIRCUITS!

To insure top performance and long life, production samples of RCA-6CD6-GA tubes are factory-checked in direct-drive circuits under typical operating conditions. Keep your profits up by keeping 6CD6-GA callbacks down. Check and adjust horizontal circuits. And, if you replace a 6CD6-GA, always *replace with RCA!*

Do you have your copy of the RCA Triple Pindex? Ask your RCA Tube Distributor about this useful servicing aid today.

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